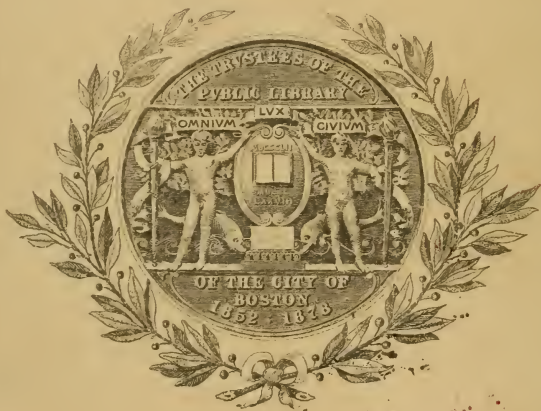


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IN THE WOODS.

THE CAMERA IN THE FIELDS

A PRACTICAL GUIDE TO
NATURE PHOTOGRAPHY

BY

F. C. SNELL



LONDON: T. FISHER UNWIN
PATERNOSTER SQUARE • MCMV

1937

CITY OF BOSTON

June 2, 1905
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THE UNIVERSITY OF CHICAGO
PRESS

CHICAGO, ILL.

1905

To

MY OLD FRIEND,

C. B.,

MY COMPANION ON MANY

PLEASANT EXCURSIONS AWHEEL AND AFOOT,

AS TOGETHER WE EXPLORED THE HIGHWAYS AND

BYWAYS OF NATURE.



PREFACE



IF any excuse were needed for adding another to the list of books dealing with the combined subjects of Natural History and Photography, I should look for it in the welcome fact that the number of converts to this fascinating form of Nature study is an ever-increasing one, and in the hope that there are still more to come. A goodly number of volumes certainly exist, many of which are the labours of experts in various branches of Nature science, who have so highly specialised their respective branches, and who in their photographic work have shown such remarkable results that it would at first sight appear that there could

not possibly be anything more to be said on the subject.

But I am persuaded that there is now a large circle of workers to whom the following pages may possibly be of interest and help, an increasing number of those who are just entering upon this most fascinating branch of photography, to whom this little volume is dedicated and for whom it has been expressly penned.

Thus it has been my object to attempt to provide an elementary and at the same time practical little book for the express purpose of guiding the early efforts of those who are now, for the first time, setting out to use their cameras in a branch of work hitherto foreign to them.

In the various branches of work which come under the heading of Natural History Photography there is so much of interest, so much still to be done, so much as yet virgin ground, that the worker on reaching a higher state of proficiency will have no difficulty in selecting the special branch of work which offers him the greatest amount of interest and which will occupy all his available time; because it is impossible to suppose that he will be able to practise and thoroughly work all the branches of Nature study.

For instance, in Botany alone there is a life's work

for an energetic worker, while Ornithology, Zoology, Entomology, Geology, to mention only the more popular branches, provide each of them enough work to occupy the undivided attention of the Naturalist-photographer for many years.

In attempting to prepare an elementary book of instruction for the guidance of the beginner in the practice of Natural History Photography I have had one constant view in mind, and that is to deal only with those subjects that are available for the ordinary average worker as distinguished from the privileged person who has special facilities and opportunities of working in favourable situations. I am not considering the needs of the worker who can undertake a fully equipped expedition to, say, Scotland or any distant place and there indulge in the fascinating if dangerous pastime of photographing the cliff-breeding birds in their natural haunts, where the scaling of precipices, the dangling over cliffs, and other perilous enterprises must be lightly and cheerfully undertaken in the pursuit of his studies.

No subjects will be found described and illustrated in these pages, specimens of which cannot be secured by the ordinary worker living in the country or by one who, living in a large town, is able to get out into the country at intervals to enjoy the study of his favourite hobby.

A difficulty which often presents itself to the person engaged in business or a profession is the very limited amount of time generally at his disposal in which to practise his hobby, his opportunities being often confined to the weekly half-holidays, a certain proportion of which are inevitably marred by the weather or required for other engagements, which renders it difficult for him to make much progress or to secure many results in the course of a season—an available working season only lasting some seven or eight months from, say, the middle of March to October. In my own case I know that if I depended only on the weekly half-day for my opportunities of work my list of results for one season would be very short indeed, therefore I recommend a plan that I feel sure will be as practicable for many others as it is for myself, and that is to try and devote two or three hours each morning before breakfast to the work. Those who, like myself, live in the country and within easy cycling distance of the woods and fields and whose duties do not call them to business at an unreasonably early hour, I strongly advise to cultivate the habit of rising early during spring and summer, and devoting two or even three delicious hours each morning to the work which will give them opportunities of seeing and enjoying the country

as they have never seen and enjoyed it before, of obtaining results that their otherwise limited time would compel them to forego, and of considerably lengthening, literally and actually, their lives. I can confidently say that many of the sweetest and happiest hours I have ever spent have been during my country rambles in the early mornings before the heat of a summer's day.

A couple of miles out from many of our large towns and cities many pleasant and profitable spots are to be found, where specimens in many of the branches of Natural History may be secured which can be either photographed where met or taken home to be dealt with, as circumstances may direct.

It has now become a well-established fact that a great deal in the way of Natural History Photography may be far more successfully done at home than in the natural habitats of the creatures themselves. One of our greatest authorities on Natural History Photography, Mr. Douglas English, divides the work into two broad classes which he describes as "Stalking Photography" and "Control Photography." In the former class come all those branches and methods of work which it is imperative or desirable to do out in the fields and woods, amongst genuine natural surroundings. This

branch, for instance, includes the photography of birds' nests and similar subjects, where the impossibility of removing them from their natural situations, and at the same time retaining their natural appearance when set up under artificial conditions, is at once apparent, or at least would be in the result.

But more particularly the term "Stalking" is intended to apply to those methods of work, such as photographing the birds themselves on the nest, or feeding the young, or at rest in some favourite spot, where such devices as concealing the camera or the operator, or both, are employed, and where the photographer lies in wait and watches for his subject to return to the nest, or to the bait laid for it. "Control" photography, on the other hand, includes all those methods of work—which may be said to be exactly opposite to those just mentioned—where the object is first secured and is then taken home and amidst imitated natural surroundings is photographed, generally with considerably less waste of time, less sacrifice of personal comfort, and often with considerably more successful results.

I am quite prepared to hear, in imagination, objections from the photographic or naturalistic purist against securing pictures of animals or other

creatures "in captivity," which objections I would endeavour to meet with one simple question: What is our object in photographing a creature at all? Is it to obtain definite results, or is it merely for the sport or entertainment of "taking a photograph"? If it is "results" that we require, photographs which shall clearly and faithfully depict the form, distinctive points, markings, and, as far as photography will suggest it, the colouring of the animal; which give us a readily recognisable picture of our subject taken amongst surroundings which imitate as closely as possible, or suggest in a satisfactory way its natural habitat; then for such results there is no method that can give us greater possibilities for many subjects than "Control" photography, even though it may be urged against it that we are photographing animals in captivity. In such work, therefore, the photographer must always use the greatest care in seeing that his results justify the means, and also that they do not proclaim the fact that they were taken under artificial conditions.

On the other hand, if the photographer prefers to deal with such creatures as may be more easily photographed out in their natural haunts, and is prepared to give the time necessary for the task; to meet the many inevitable disappointments, and

to deal with his subject in the most difficult way, hoping for the satisfaction of showing results secured under absolutely natural conditions, or, desiring to study the habits of the creatures themselves when under no other restriction than the eyes of the observer, then there is no reason why he should not attempt the method of "Stalking."

F. C. S.

CANTERBURY, *November*, 1904.





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“THERE IS A PLEASURE IN THE PATHLESS WOODS.”

PART I

THE CAMERA AND DARK ROOM

THE APPARATUS.

PROBABLY one of the first thoughts which occurs to the worker who is thinking of entering upon this department of photography is about the apparatus required, or the suitability of his own, if he already happens to be a photographer. In speaking of the apparatus required and the methods of work, I shall assume that my reader already has some knowledge of photography in a practical form, because if he has not I would strongly advise him first to go through a short course of photographic practice in order to learn the uses of his instrument, as well as the manipulation of development, printing, &c., in order that he may, when at work in the field or at home, be able to give his whole attention to his subjects, which of themselves will often require all his skill and

patience to overcome the many little difficulties that their restless habits or other peculiarities may present, without the need for him to have at the moment the extra cares and worries of the photographic process. For instance, it is not only discouraging, but sheer waste of time, to expend energy and patience in exposing the plate on a difficult sitter, and then to find on retiring to the dark room that our efforts have been wasted by our utter inability to transform the exposed plate into a good negative. Therefore to the beginner a few weeks spent in gaining experience in the process of, say, landscape photography before he attempts to start work in real earnest will be time well spent and will save the worker much subsequent waste of time, patience, and material.

With regard to apparatus, it may be said that practically nothing more is necessary at the outset than the ordinary stand camera of the amateur photographer. That a *stand* camera is required it seems hardly necessary to state, and yet I have been asked by those wishing to try some of the branches which come under our subject, how to proceed to work with a hand camera. There is only one reply to such a question, and that is that it is impossible—at least with the ordinary form of hand camera—and that for one simple reason,

As most of the objects with which we are about to deal are of a small size—small compared with views, houses, and such other subjects for which the hand camera is intended to be used—it follows that these must be photographed at a much shorter range, with the natural consequence, known to all photographers, that in photographing objects at a short distance a much longer stretch of bellows is required, while at the same time focussing must be adjusted with great exactness, often a small stop used in the lens and a *time* exposure given, which, of course, necessitates a tripod camera. The ordinary camera, then, if with a length of bellows equal to about twice the focal length of the lens, and with a tolerably good lens and provided with two or more double plate-holders will answer our purpose. It is an advantage to have square bellows to the camera which should be constructed to rack *backwards* for preference, instead of, as is usual, forwards, as this will be found to be a great convenience when focussing at very close range.

The tripod should be one that is stout and firm rather than neat and light, as for this work appearance counts for much less than strength and rigidity, and as the apparatus almost always comes in for a certain amount of rough wear its strength

and durability is a point of prime importance. The only piece of special apparatus not usually found in the kit of the amateur photographer is some form of tilting top to be attached to the tripod that will allow the camera to be pointed downwards at any angle, as most of our photographs will be taken looking somewhat downwards, more or less, on to our subject. This fitting can generally be easily made by the photographer himself, as it only consists of two short boards, say about 6 inches long by 4 inches wide, which are hinged together at the front edge, the lower board being fixed with a thumbscrew (obtainable of any ironmonger) through the hole in the tripod head, and the upper board carrying the camera which is held in place by the ordinary screw which would otherwise fix it to the tripod head. A brass stay-bar—or, what is better, one on each side—with a winged nut on a screw, hold the camera in position at any angle. This is a most essential little bit of apparatus and is easily carried in the bag with the camera. The lens is without doubt the most important item in our list of apparatus, and should be as good a one as the photographer can afford. Many of the cheap R.R. lenses that are supplied with ordinary stand cameras will do

very good work indeed, and in all cases the result will be more owing to the man behind the camera



NIGHTINGALE'S NEST.

than to the camera and lens itself; still, the better the lens the greater the power it puts into the hands of the photographer; and as excellence of

definition is of the first importance, and the opportunity of using a large aperture often a great convenience, it is money well spent to secure as good a lens as possible. I have found, however, that with the great bulk of work the use of a large aperture is not possible on account of the want of "depth of focus."

In work with small objects, taken at close range, such as insects, and even the smaller animals and birds, it is often difficult to use a stop as large as $f6$ or even $f8$, as only a small portion of our subject can be brought into focus at once, even if it is stationary, which is often *not* the case. As we shall see later, very often the only method of focussing is to focus sharp on some twig or spot to which our sitter is likely to return, and wait for his arrival, when the exposure is made. In such a case it is rarely practicable to use a large stop, as it is almost impossible to get our sitter into the exact spot wished for.

As is well known to all photographers, the lens when used at such close range will only cover from back to front for a very short distance, often a small part of an inch, before or behind the *exact* point of focus, sufficing to render those parts of our object more and more out of focus. The illustrations in this little work were almost all done with

a cheap "Euroscope" lens of French make which has an aperture of $f6$, and cost, when new, thirty shillings, and I have seen pictures, chiefly of birds' nests, equal to anything shown here, done with a lens fitted up by the photographer himself with lenses costing only a few pence each, so that although an expensive lens is often a great convenience yet for a beginner it is by no means indispensable. With regard to telephoto lenses, which some more advanced workers find so invaluable in the field, these instruments are only necessary for the specialist or the expert, to whom, of course, I cannot attempt to offer any assistance or advice. Personally I have not yet felt the need for their help, and the beginner may rest assured that he will not require such an instrument for some time. However, experience will in due course suggest to him what he may require in that direction.

A shutter of some pattern will be a necessity, which, perhaps, the photographer already possesses. A behind lens shutter of the roller-blind pattern, giving various speeds, will be found as good as any *if* a noiseless one can be obtained. But here we are met by a real difficulty in obtaining one that *is* noiseless. With most of the roller-blind shutters obtainable a very serious

objection is found, for most of them give a very unfortunate click at the moment of exposure, or, what is often still worse, just before the exposure actually takes place.

In all other ways they may be almost or quite perfect, free from vibration and admitting the utmost possible amount of light, yet their giving this objectionable click before or at the moment that the exposure is taking place more than counterbalances any good qualities the shutter may possess.

In photographing a restless or nervous creature, such as a rat or mouse, for instance, a noisy shutter will be found a frequent cause of failure, while in dealing with birds on the nest, such a sound will effectually upset all the photographer's most careful attempts and elaborate preparations. In photographing some mice with such a shutter some time ago I met with this difficulty repeatedly. After waiting time after time for my sitters to get into a nice position—a condition of things which, with such restless creatures, is only obtained at rare intervals—and selecting a good and characteristic pose, I pressed the bulb, click went the shutter, and at the same time up went their heads at the very instant the exposure was being made; and so plate after plate was spoiled. I

noticed that on hearing the noise of the shutter they invariably threw up their heads to listen, and thus remained some second or two, during which



YOUNG THRUSH.

time they kept still and alert, often in capital positions for a photograph, when, had the plate then been ready for exposure instead of already

exposed, a good picture could have been secured with ease. This fact at once led me to try a different plan. I thought that if I could make an artificial click with something to arrest their attention in this way, during the time they had stopped to listen would be a good time to expose the plate. This plan proved successful and resulted in some good studies.

Undoubtedly for this work the best and most effectual form of shutter is the "focal plane." This shutter which works inside the camera, close against the face of the plate, is in the form of a blind, in which is a slit which is narrowed or widened to reduce or increase the length of exposure. The blind travels across the plate, and by working close to it utilises all the light that is passed by the lens, thus giving fuller exposures than any form of shutter that works on the outside. The only drawback to these shutters is that they are somewhat expensive.

Another valuable little piece of apparatus for those commencing this work is an "exposure metre," which, if thought by some not an absolute necessity, will be found, particularly in the earlier stages of the photographer's career, to save its cost in plates alone, to say nothing of the saving of time and disappointment it will effect. What

more provoking (as I have by dearly bought experience found myself) than after, perhaps, a long journey, or a great deal of time spent in securing a certain subject, or after having the fortunate opportunity of exposing a plate or two on some unusual or rare subject, to find when in the dark room that our exposures have been hopelessly over- or under timed? How many journeys may this little bit of apparatus often save? The more expert worker may possibly be able to judge his exposures with quite as much exactness for himself; he has, too, the aid of his knowledge of development to enable him to make the most of any given exposure. Not so the beginner. He is called upon to work in a variety of situations, the light in which is of the most variable quality as well as quantity, and he requires his exposures to be calculated as near as possibly correct, as his limited knowledge of the power and effects of his chemicals places all his chances of success on the exposure he has given, rather than on his knowledge of how to treat his over- or under- exposed plates.

With regard to the make and speed of plate to be used, this is largely a matter of personal preference. And as the photographer is here supposed to have had some experience with plates, his own

preference will largely guide him. Although the slower the plate, the easier in development it will be found to be, and the greater the latitude in exposure it will allow, it is rarely that the slow brands can be used on account of the necessity of often giving short exposures. With rapidly and constantly moving objects such as animals and birds, and often with such apparently still subjects as nests where, however, the wind often keeps the surrounding foliage, as well as the nest itself, continually on the move, and which are, moreover, often placed in dull and badly lighted situations, a rapid plate is the only one that can be used. Although we may meet with subjects where a fairly long exposure may be given, yet these will be found to be the exception rather than the rule. The question as to whether ordinary or orthochromatic plates should be used cannot be decided without first knowing what our subject is to be. For many objects—animals, birds, reptiles, and insects—an ordinary plate will give, as good a rendering as an orthochromatic one, but, on the other hand, where reds and yellows predominate in our subject, the advantage of using a plate more sensitive to those colours is obvious. Against the advantages of the orthochromatic plate is to be placed the impossibility of obtaining them of more

than medium rapidity, although it must be understood that a medium rapidity orthochromatic being more sensitive to the non-actinic colours than is the ordinary, would be found to give a more fully exposed negative than the medium ordinary, although in actual speed they may not really be faster.

As to the use of colour screens, these will be rarely required, as there are but comparatively few subjects where the more actinic colours—blues and violets—are found to any extent, and it seems useless to use a screen unless these colours in our subjects are at all pronounced, as the effect would be no other than that of increasing the exposure required without any perceptible gain in the result.

I often hear workers discuss the using of a colour screen for objects containing none of the more actinic colours, simply because they happen to be using an orthochromatic plate, which they seem to regard as useless unless used with a screen.

To my mind, it seems that they have overlooked the essential properties of the colour screen, or the purpose for which it is used—that of cutting down or keeping back the blue and violet colours of any object photographed. If any one of my readers should have any doubts in his mind as to the value of the chromatic plate used without the screen (and

I know that there are many photographers who have) I would strongly recommend him to make a few tests on suitable subjects, the result of which I feel sure will as firmly convince him as it has done myself. A coloured picture, or a piece



DAFFODILS.

(Taken on ordinary plate.)

of coloured drapery, or what is more satisfactory still, one or two groups of flowers, of a yellow or orange or pink colour (it is of very little use pushing our experiments to red, as scarcely any orthochromatic plates are sensitive to that colour) should be photographed first on an ordinary plate and

afterwards on an orthochromatic one without using a screen, the exposures for each being given relatively the same according to the relative speeds—and the results compared. A group of primroses, marsh marigolds, daffodils, or pink champions will



DAFFODILS.

(Taken on orthochromatic plate used without screen.)

be found a suitable test subject, and the results will, I feel sure, convince the most sceptical on the point.

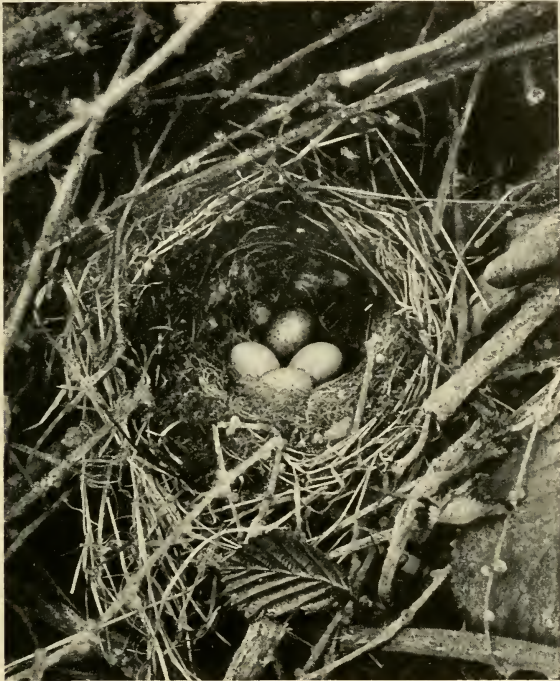
The two illustrations given of beds of daffodils in a garden will, I think, be sufficient to prove that for certain subjects orthochromatic plates give far

better results in the matter of the correct rendering of colour than ordinary plates, and also that chromatic plates can be used to advantage without the use of the colour screen. No. 1 was taken on an ordinary plate of medium rapidity. The camera was then moved a little in position and No. 2 taken on a slow chromatic plate without a screen. Exposures were adjusted according to the relative speed of plates and both proved to be fairly correctly exposed. The results I commend to the notice of unbelievers.

But where blue or violet enters largely into the colouring of our subject a colour screen must be used to give us a true rendering of the colour values. If, for instance, we are engaged in photographing a Blue Tit, or a group of the well-known blue flowers, the common Succory, a colour screen used with a chromatic plate becomes a necessity, but with a Yellowhammer or a group of Primroses, for instance, although the orthochromatic plate is just as necessary the screen in such cases may be safely dispensed with, while for a Thrush or Sparrow or any similarly sober-coloured object, I see no advantage in using either over the ordinary plate.

The sizes of plates to be used (as well as the size of the camera) must also be left to the decision of the worker himself, in which he must be guided

by two things—original cost, and maintenance and weight of apparatus. Most workers use and



HEDGE SPARROW'S NEST CONTAINING CUCKOO'S EGG.

recommend a half-plate camera for the work, which is indeed a very suitable size, although personally I have never used anything larger than

quarter-plate ; and that for two important reasons. When large numbers of plates are being exposed (and large numbers are and must be used if the worker is at all energetic and is persevering when dealing with some of the difficult subjects he finds himself called upon to tackle) the cost of plates alone for the worker in modest circumstances often settles the matter. To obtain a few successful results it is often necessary to cultivate a reckless disregard of the number of plates used when dealing with some exceptionally restless sitter. Three hundred plates is by no means an excessive number to use in a season, the difference in price of which between quarter- and half-plates is somewhat considerable, to which must be added the cost of printing materials, chemicals, and albums or mounts, or provision for whatever system the photographer uses to keep his prints in order and ready for inspection.

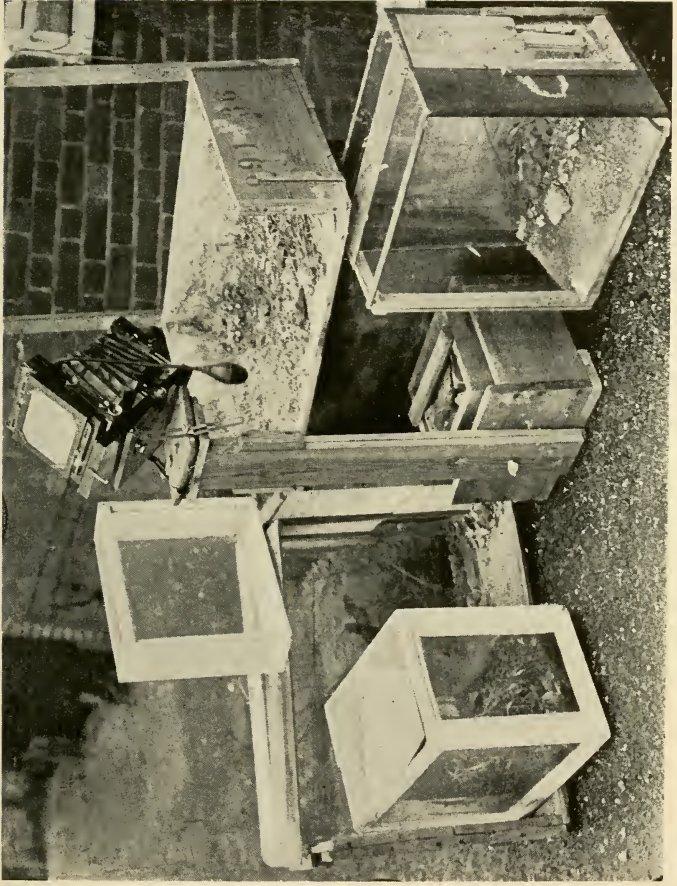
Now, supposing that we are at work upon some such restless and difficult subject as rats, mice, or similar creatures, it may be easily understood that a dozen or two plates must be used to get two or three good studies. I readily admit that when we do get a good result a half-plate is not too large for it—in fact one wishes then it were about 12×10 —but for the failures (and the Naturalist-

photographer knows too well how many of his plates take the shortest possible cut from the developing dish to the dustbin) quarter-plates are amply large. At the same time it must be borne in mind that if the worker uses a half-plate camera he has the opportunity, when the exposures are of a "risky" nature, of using quarter-plates in it by means of carriers in the dark slides, often with the added advantage of being able to work at a distance farther from his subject than when using a quarter-plate camera, which is at times a great advantage if our sitter is a shy and restless one. But in those fortunate cases where we do secure a good result, but of a small size, if the negative is as good as it should be, enlarging will always give us a good picture of any size up to at least 12×10 , while for lantern-slide making, quarter-plate negatives are as suitable and often more so than larger sizes. My second objection to the use of a large camera in the field is the weight of it. When out for a day or a long afternoon's tramp, I have found the weight of a quarter-plate camera and slides, with the necessary etceteras that must be carried, more than enough, and coming home in the hot sun, often with a severe backache, have been thankful to think I have not had the extra weight of a larger camera to carry. But these two matters of

depth of pocket and physical endurance can best be settled by the worker himself.

Besides the camera and the necessary accessories the photographer will at various times when in the field need the assistance of sundry little odds and ends which, however, the pockets of the field worker usually contain, such as string for tying back boughs of bushes, a knife, if any cutting away has to be done (which, however, should always be carefully done, and then only when quite necessary), some tissue paper, which is often invaluable for softening sunlight falling on a nest or any principal object in our picture, and such other small conveniences as a very short experience will suggest.

For work at home, by the "Control" method, a few cases or boxes in which to photograph specimens will be required. The construction of such as need describing will be dealt with later on when we come to the use of them. The illustration shows the cases I use in my own work, and will with the description, I think, form a guide for the worker in constructing his own, or may act as a suggestion on which he might make many improvements. I feel sure he will find no difficulty in making something similar for himself, or in getting some friend to do so for him, failing which



No. 1

No. 4

No. 3

No. 2

CASES USED IN PHOTOGRAPHING ANIMALS AND REPTILES BY THE "CONTROL" METHOD.

the cost of having one or two made would not be great. Each of the cases, and the purpose for which they are used, will be referred to later on, but the stand which supports the camera may be described here. A rough box at the bottom is weighted with stones, and to it is fixed one of the upright boards. The other one carries the camera and can be adjusted by the thumbscrew, which runs in the slot, to about the height of an ordinary tripod. This rough contrivance I have found to have a great advantage for home work over a tripod, whose sprawling legs seem to have an unfortunate habit of getting in one's way and causing us frequently to upset the camera always at some critical moment. The tilting top described some time back is also seen in use and explains itself.

IN THE DARK ROOM.

Although it may seem premature to consider development before we speak of exposure, yet what there is to be said on the point may perhaps best be said now before we come to consider the actual work in the field or at home. The photographer, as I have assumed, will have had at least some experience in negative-making, so that his efforts in the dark room will be to bring to a

successful result any good fortune he may have had in securing subjects. With regard to the question of developer to be used, whatever developer the photographer is accustomed to use, if it proves successful in his hands, will be equally useful for this work, providing it is one that can be modified to suit the variety of the exposures he will necessarily be called upon to give. Probably the great majority of workers still find nothing more efficient than pyro, which many declare will do all that any other developer can do—and more on occasions. For normal or over-exposures the experienced photographer probably prefers it to any other, while for under-exposures, if used in conjunction with metol, there is no doubt as to its bringing out of a plate all there is in it, which is as much as can be expected of any developer yet invented, while the slight yellow stain characteristic of a pyro-developed negative gives it (unless in excess) a printing quality certainly not possessed by the clean grey negative of the “pretty” order produced by the variety of non-staining developers. In cases of gross under-exposure, where development is likely to be much prolonged and pyro is apt to give too much stain to the negative, some workers prefer to use one of the newer developers which do not stain and



YOUNG THRUSHES.



which do not give density too quickly. Metol is one of these, whose action is to bring out the detail in the plate first, and afterwards to gain in density slowly and gradually. There are also a number of others known to photographers which act in a somewhat similar way. Paramidophenol is said to be the most energetic developer known, and to be able to do more in the case of gross under-exposure than any of the other developers. Most of the newer developers can be used mixed with pyro, which often produces an excellent developer for dealing with normal exposures, the density-giving powers of the one with the detail-giving properties of the other producing a combination quick in its action and clean in its results.

The strength and proportion of the developer suited to the plate being used is best obtained from the formulæ supplied by the plate-makers, who have themselves every reason for recommending the most suitable strength of developer for their own plates, these formulæ being easily modified by the photographer should he prefer negatives of a special strength or printing density. For those workers who possess only a limited experience, no better plan for obtaining negatives of a fair average density or printing quality can be recommended than that of developing by the

“time development” system—a system invented by Mr. Alfred Watkins, of exposure-metre fame. This plan, which consists of developing the plate for a certain time, fixed by the behaviour of the plate when in the developer—that is to say, the sign of the first appearance of the image on the plate—gives us the power of producing any number of negatives of almost identical printing quality with ease and certainty. For the benefit of those who may not be already acquainted with it, briefly, the system is as follows: The time taken for the image to appear on the plate, from the moment of pouring on the developer, being a guide as to the exposure the plate has received and as to the total time necessary to continue development, this “time of appearance” is watched for and noted, and the length of time development is carried on is governed and fixed by this length of time of appearance, according to the particular developer used. The total time development is continued is regulated by the kind of developer used, according to its strength or density-giving properties, strong pyro solution and hydroquinone requiring a shorter time for development than metol, rodinol, or a much-diluted pyro solution. By “strength” is meant strength of the developing agent, the solution that gives the density, *not* the

accelerating agent, such as the soda solution, which makes an "energetic" developer, not a "strong" one.

In practice, then, the time of the appearance of



THRUSH ON NEST.

the image being noted, this time is multiplied by a factor decided by the strength of the developer, and the plate developed for that amount of time. Tables giving the time factors of the different

developers are obtainable from most dealers, and are frequently published in the photographic Press. Thus, a medium strength pyro solution may require five times the length of time of appearance, hydroquinone five times, ortol ten times, metol thirty times, and so on. It must, I think, be obvious to any one that this system puts a power into the hands of the photographer—and more especially the beginner—of obtaining with ease and accuracy negatives which will give prints almost identical in quality, from his necessarily varied exposures—a task he will find it almost or quite impossible to accomplish if he trusts to his own judgment as to when to stop development. It must not, however, be supposed that the negatives produced by this plan will be identical in appearance—far from it; some will be much denser than others, according to the correctness, the excess, or the insufficiency of the exposure given. But it is the prints that we are most concerned with, and these, although from a series of negatives of varied quality, will be found almost identical in appearance if the system is correctly followed out.

The quality of the negative—the density or thinness—is a matter that should be decided by the printing process we are likely to employ, some

papers such as P.O.P. requiring rather thin, delicate negatives to give the best results, others requiring a rather stronger and more sparkling one. In any case it is necessary to avoid the over-dense negative, as a hard, black and white effect is never pleasing in the finished picture, often proving most misleading in suggesting the actual colouring and markings of birds, animals, &c.—a soft, delicate print, full of detail, being the desired effect that we should aim for, which of course requires that we should give sufficient exposure to the plate.

But in those unavoidable cases, where our exposures must of necessity be short, and where continued development to bring out the detail results in a negative of more than necessary density, these can often be corrected by using a reducer, such as ammonium persulphate, which reduces the dense parts of the negative more than the thin, and so flattens it and gives us a more harmonious result.

Having made our negatives, the next step is to obtain prints from them. The choice of the printing process to be employed is worth some thought and care in selection. There is no room for doubt that platinotype and carbon are the two best processes that can be employed for this or any other work, prints by these processes being as permanent

as paper prints can ever be supposed to be, which is far more than can be said of many of the other processes. Beautifully rich, yet soft and delicate, black and white prints are produced by the platinotype process, while carbon gives us an almost unlimited range of colours suitable for all subjects.

Either of these processes is easily learned by the beginner after a few trials, instructions for which are generally provided with the papers, and are also frequently given in the columns of the photographic journals. Bromide forms a very good substitute for platinotype in appearance, and if the details of the process, such as thoroughly fixing and well washing the prints, are properly carried out there is no reason why they should not prove to be fairly permanent. Some of the matt surface printing-out papers also give prints of a very pleasing brown tone, especially suitable and suggestive of the natural colours of many Natural History objects.

In choosing the colour and the process for a print for any given subject, consideration should be given to the natural colour of the object represented; a bird or animal that is brown being best reproduced in a brown print, while reptiles and many of the insects look best when printed by a black and white process.

The method of mounting and storing the prints is another matter to be carefully settled, in connection with which two or three things should be taken into consideration. The effect of such a collection of photographs as we are considering can be either made or marred by the way they are displayed. Some form of album where the prints are kept safe from damage and are easily accessible is the most suitable and convenient plan of storing photographs of this kind. As the collection is likely to be a large one, an album holding a good number—not less than about two hundred to three hundred—should be provided, and one with tinted leaves of a variety of shades gives us the advantage of mounting the prints on a colour best suited to harmonise with the pictures themselves, as well as giving a pleasing variety of effects to the whole collection. If such an album is not to be found to suit the taste of the photographer, it is not a difficult matter for him to make one that will meet his ideas for himself, as a variety of papers in many suitable art shades are now obtainable. Or even a variety of brown papers of different shades and tones makes a very effective and suitable album for the purpose, being quiet in tone and showing off the prints to great advantage. The albums now so well known as “Sunny

Memories" are also very suitable for these photographs, as, being provided with openings, several on a page, of a variety of shapes and sizes, these are very useful for many of those subjects where the subject of the picture does not always occupy a very large part of the plate. Whatever album is selected, one system should be always followed, and that is to fill each page with subjects of one particular class. That is to say, birds' nests on one page, animals on another, reptiles on another, and so on.

Complete pages such as these can very well follow each other in almost any order, and will look well, but it can never give any other effect than that of ill-assortment to have one nest, one animal, a reptile, and two or three insects on one page with this needless and unpleasant variety continued throughout the book.

Besides prints the photographer should sooner or later make up a series of his photographs as lantern-slides, for photographs of any subject look infinitely better under these conditions than they can ever look in the best paper print producible.

The richness, transparency, and depth of the shadows, the brilliancy of the lights and the general clearness of the middle tones as the lantern-slide is viewed—whether in the hand or by the lantern



LINNETS.

—with the light coming *through* it, instead of falling upon it, place the lantern-slide or transparency far and away above every other known method of photographic positive. And besides this there is the use to which slides can be put, and the opportunity of showing the pictures, not only of an enlarged size, but to a larger number of persons at a time. Lantern-slides of these subjects not only form useful and often valuable illustrations to lectures of a more or less scientific kind, but are almost always appreciated by every one, whether they are shown to a few friends at home or to a larger audience in the course of an ordinary lantern show. For this reason the photographer will do well to always have an eye to the pictorial as well as the scientific interest of any subject he may be engaged upon; birds and birds' nests, perhaps, offering the greatest possibilities in this direction, although with almost all objects with which we have to deal the "setting" of the subject—that is to say the background and other accessories—will be found to have a great effect in making something that is a scientific study and a picture at the same time.

Lantern-slide making, too, gives us the opportunity of getting the best possible result out of any given negative, and although it goes without

saying that the best slides are made from the best negatives, yet it will often be found possible to make a very good slide from a very indifferent negative, far more so than can ever be done in the way of making a paper print. Over-developed hard negatives, by giving a full exposure to the lantern-plate and the use of a well-diluted developer will often yield slides little, if any, harder than is desired, while with the converse difficulty of thin negatives by giving a short exposure to the lantern-plate and using a strong, well-restrained developer we may get slides that are much stronger and more brilliant than any result it is possible to get on paper.

If the photographer is working in small sizes—for instance, quarter-plate—if his negatives are sharp and clear and of good average density, he need not either remain content, or be dissatisfied with, his results on the small area of 4×3 , as enlarging will give him pictures up to a reasonable size, many of which will stand enlarging up to 12×10 , with hardly any perceptible loss of quality, although for this process negatives must be fairly good, and, above all, not too dense.



"A WOODLAND POOL."



PART II

ORNITHOLOGY

ON PHOTOGRAPHING BIRDS' NESTS.

NOW, having provided ourselves with the necessary apparatus for photography in the field, and the materials for the after processes, we are anxious to make a start in that wide sphere of work which lies invitingly open before us. It is probable that the great majority of workers when they first set out in this branch of photography—providing they are starting operations in the spring—commence with the photography of birds' nests and eggs, which is indeed a very suitable subject as an introduction to the work. In the first place, subjects for our early efforts are easily found and are fairly easy to photograph, as plenty of time can be taken in arranging the camera, focussing, and otherwise preparing for the exposure, which can often be of as long duration as is necessary

to the lighting of the situation, unless the wind happens to be troublesome or the spot is much exposed. These subjects often make very pretty and pleasing pictures, and in the short time available for this work during our first season, a number of interesting studies should be secured, which will give us a good start in our subject, and a considerable interest in one section of Natural History.

As it is for only about two months or so in the year that these subjects are to be found, it follows that we must make the best use of our time, and be out on every possible occasion selecting our ground with regard to that particular part of the season, so as to look for the different nests when they are most likely to be found. The few illustrations of nests here shown, which are mostly all those of our commonest birds, are selected from a collection of about forty species, and were obtained in three or four seasons. Any photographer who is fairly industrious will have found the majority of the nests of his district during his first three or four springs, his finds of fresh species after that time being few and far between, whilst, of course, if he wishes for pictures of nests not peculiar to his own neighbourhood he must be prepared to go for them into the districts where they are to be found. But

there will always be many nests even of his own district that will appear almost to defy his efforts to find them, although he may occasionally see the birds themselves. For these continued perseverance and a fair measure of good luck will probably in time reward him.

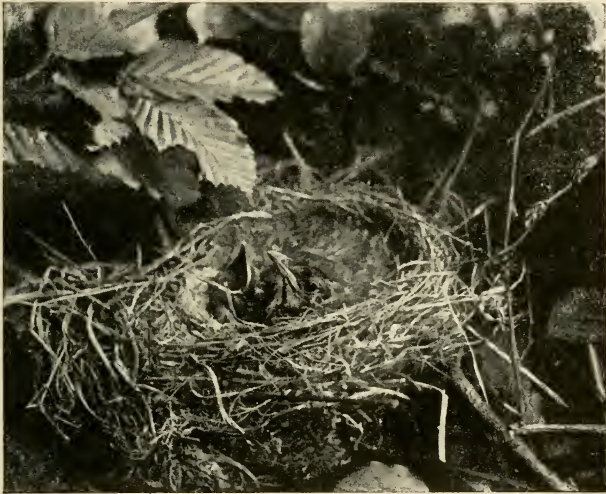
A great deal of information as to the localities, nesting sites, and habits of the birds, as well as descriptions of their nests and eggs, their songs, and illustrations of the birds themselves, is readily obtainable from the host of books dealing with the subject, and some study of these is strongly recommended to the beginner, although, after his first start in this, as in all other studies, the old maxim that an ounce of practice is worth a ton of theory will be found to apply. No information is so profitable, and no impressions so lasting, as are those that come from personal observation and experience gained at first hand by the worker himself. One danger that seems to result from the cramming of oneself with too much information (and I know that it has been experienced by others besides myself), is that the beginner is apt—in fact, he seems destined to be—much disappointed with his own early efforts. Having read where such and such birds or nests are to be found, he goes fully expecting to find them, and in

many cases, being met with nothing but failure, he is apt to be discouraged, and tempted to give up in disgust. A few expeditions with a friend more fully acquainted with his subject will do more for the beginner at the start than heaps of books and cramming of facts, as these excursions will teach him the possibilities of his hobby, and set him on the road to success, instead of his having to waste time groping in the dark of his ignorance of his subject.

As more knowledge of birds and their habits is gained, the worker will soon be struck with the fact that there is even more beautiful variety in their habits than in the birds themselves. And as he learns to recognise the form and the plumage, the flight, song, and favoured situations of the different little choristers, what additional charm the country walk possesses! How he misses them from their accustomed places in winter! how he welcomes them back again as old friends each spring! How charming to him the first sight of each familiar nest and egg that he finds for the year! These are pleasures which none but the Nature lover knows, of which he never tires, and in which there is always something new.

Probably one of the first nests found by the photographer will be that of the Blackbird or

Thrush, partly on account of their abundance, partly from their larger size and generally ill-concealed position. In spring a walk through any wood will almost certainly provide a number of



YOUNG THRUSHES IN NEST.

these big, bulky nests, often appearing like a handful of hay thrust into the slightest and thinnest of thorn bushes, or just stuck into the crutch or at the stock of a tree, often with little or no attempt at concealment.

If at not too great a height for photography, one

of these will make a good subject for a first attempt. A side lighting should, if possible, be selected, as this gives better relief to the nest and more roundness to the eggs than if they are lighted from the back of the camera. If leaves or branches obscure the nest, these should be bent or tied back, but never, if avoidable, cut away, so that we may replace them as they were found, for the photographer should be careful always to so re-arrange the spot so as to conceal the nest as much as possible, although with the nests of thrushes and blackbirds this is often an impossibility.

Having arranged the camera, then, so as to look slightly down into the nest, so that just the tops of the lower eggs are seen, and having focussed and stopped down the lens, we look to the surroundings, and, if necessary, arrange a branch or bramble with leaves behind or near the nest, which need not, however, be in sharp focus; in fact it is often better that it should not be so, as the background and surroundings, if shown but slightly out of focus, give prominence to the nest and eggs, which are the principal objects in the picture. If any leaf or branch protruding too near the lens looks unnaturally large and out of focus, or, by catching too much light, appears on the screen as an unsightly white blotch, this is

better kept back out of the picture, as in the photograph this will appear very unpleasant, and will at once catch the eye and mar the beauty of the whole subject.

It will be found also far better, if possible, not to photograph nests in full sunlight, as the effect of light and shade on foliage under these conditions is very trying. More especially is this so if the nest is surrounded by leaves with a shiny surface, such as ivy. The brilliant sparkling lights, contrasted with the deep shadows cast by these thick, opaque leaves, make it almost impossible to avoid a very hard, black and white effect if this class of foliage is photographed in sunshine. But also with foliage of a dull surface, if the sunlight falls on the background, this will appear in the print as an unpleasant arrangement of black and white blobs, which is distracting to the eye, and often detrimental to any picture.

When working in sunlight, the difficulty may be overcome by holding an umbrella some distance away so as to cast its shadow over the subject. Or, if a friend is at hand, a better plan is to hold a large sheet of white tissue paper for that purpose, the shadow cast by this being much softer and not stopping anything like the amount of light that the umbrella does. One plan a writer on the

subject recommends for the purpose of softening down obtrusive backgrounds is that a large sheet of thin "cheese cloth," or gauze, be hung between the nest and the background, through which objects behind are seen soft and subdued. This is certainly a very effective plan for those who like to try it, and do not mind taking the extra trouble—and providing the situation will admit of it—but in most cases, if care is used in selecting and arranging the background and in the lighting, this may be dispensed with. When all is in order the exposure is made, for preference with a time shutter, as any risk of moving the camera when taking off the cap is thus avoided, care being taken to give a somewhat full exposure, as in these subjects this will be found to give a better and softer negative than if the exposure is bare or insufficient. After exposure, remove the camera and replace the surroundings as naturally as may be; and if it is a nest capable of concealment leave it as well concealed as possible, seeing at the same time that we leave no traces of our visit by having stamped down the undergrowth, which might betray the presence of the nest.

Further search in the wood may reward us with other nests, which, as they are found, require attention to the same details, with some variations.

If in early spring we may chance upon the pretty little nest of the Hedge-sparrow, neatly made of moss, and lined with wool and hair, and containing eggs of a most beautifully rich blue. This is one of the most beautiful nests to be found, as regards colour combinations, no photograph in other than natural colours being able to do it anything like justice. The lovely delicate blue eggs, in the woolly-lined mossy nest, surrounded by the pale green spring leaves, form a picture that simply mocks the camera. These nests are mostly found in a hedgerow, or in a bramble, or a gorse bush, while quite a favourite spot is in a heap of hedge-cuttings or other rubbish often found thrown up into some corner.

The Long-tailed Tit is also an early builder, and provides for itself the most beautiful little structure it is possible to imagine. This little domed nest, thickly felted, of moss and vegetable fibres, covered all over with bright-coloured lichens, and warmly lined with large quantities of feathers, forms, perhaps, the most beautiful nest we have. Although often placed in a conspicuous position, it will frequently be found in situations—such as among lichen-covered branches—which it matches so accurately as often to require some seeing, even when the spot is known.

A gorse bush, a bramble thicket, or hedgerow, is the favourite spot with these little birds; but the prettiest natural picture I ever saw was the one shown in the illustration, situated in a blackthorn bush in full bloom. A large number of eggs (which from the nature of the nest cannot be shown in our photograph) are laid by this bird, from ten to thirteen being often found, although I would strongly recommend any one finding one of these nests not to go to the trouble of taking them all out to count, as that is hardly possible without seriously damaging the nest, the hole provided for entrance being only just large enough to admit a single finger.

The Missel-thrush, being one of our earliest builders, may now also be looked for, but in a rather different situation. This nest, generally found in a wood, is built as a rule in the fork, or planted flat on the branch of a tree at some little distance from the ground. The nest, a large one as it belongs to a large bird, is very much like a Blackbird's in appearance and contains five or six bluish-grey eggs richly mottled with red-brown spots.

In order to photograph this nest it is nearly always necessary to climb the tree, or another close by, should there be one near enough to command



LONG-TAILED TIT'S NEST ON BLACKTHORN BUSH.

a view of the nest. This is also the case with a number of other nests, such as the Hawk's, the Dove's, the Jay's, and such other birds as place their nests well up above the ground.

With Rooks—from the nature of their nesting sites, right up at the tops of the trees on the slender branches—it seems almost incredible that any one could possibly obtain photographs of their nests; yet this has actually been accomplished (by means of a ladder lashed upright to the branches of the tree) by the Brothers Kearton, who are workers possessed, we must all readily admit, of a far greater amount of daring and ingenuity than is likely to be found in the average photographer.

But among the lower and stouter (and consequently safer) branches it is often possible, without any very great amount of trouble or any serious risk, to arrange the camera, by lashing it in the forks of the branches, to get a photograph of some nest, and with the help of a friend to pass up the apparatus, this often affords a pleasant form of mild adventure.

A little later in the spring, say by the early part of May, if we happen to be in a district frequented by our sweetest singer, the Nightingale, we must search for this nest, which, however, is a difficult one to find. Down on the

ground in some wood, amongst the dead leaves, under a bush, we must look for a deep, cup-shaped nest, composed almost entirely of leaves, wound and plaited round—a rather bulky and not over-neat affair. The eggs it contains are of a brownish-green colour, without any markings, which harmonise well with the colour of the nest itself and its surroundings. From the nature of the situation and the colour of our subject, this is one that often calls for very long exposures, the one illustrated having required some 90 seconds at $f22$ with a rapid plate. If nettles or woodland flowers surround the nest it adds greatly to the effect of the picture, besides indicating the nature of the situation. Several other nests are also to be found on the ground in the wood, such as the Wood Warbler, the Chiffchaff, and others, all of which, as may be supposed, are far more difficult to find than those situated in the bushes and trees. Some are concealed amongst the tall growth of vegetation which springs up everywhere by the middle of May, and only a most thorough search, or the fortunate circumstance of seeing the bird leave the nest, will reward us with one of these finds.

The Whitethroat is one of the birds whose nest may be found in such a spot. The nest is mostly formed of hay and vegetable fibres, and contains

eggs of a yellowish-white colour, covered with grey spots, and known to country lads as "pepper and salt" eggs.

Right on the ground amongst the leaves and rubbish, or cleverly concealed by the herbage, if we are fortunate we may find a nest of the Wood Warbler, the Willow Warbler, or the Chiff-chaff. These nests, which are not over-abundant, are always difficult to find, and if seen they look like nothing so much as a little lump of leaves or rubbish, being of a domed shape with an entrance at the side, and appearing as little like a nest as possible. I remember a year or two ago unpacking and repacking the camera within a foot of a nest of the Chiff-chaff, little thinking that the wisp of leaves and rubbish amongst the sticks at the foot of a tree was a nest, until, passing the spot a few days later, I was surprised to notice the lining of the nest torn out and the broken shells scattered about, evidently the work of a rat or weasel or some such enemy of the ground-building birds.

These nests are somewhat difficult to make into pretty pictures, and will probably form photographs rather of interest and scientific value than pictorial beauty.

The woods still provide us with the nests of many other birds. The Blackcap, one of our

sweetest songsters, often chooses a clump of brambles, where its thin, fragile little nest, with the bottom so slight that we may see right through it, looking almost too frail to hold the delicate eggs, let alone the bird itself, is as a rule but poorly concealed, and consequently easy to find. The Garden Warbler, another of our best songsters—whose note it requires an expert ornithologist to detect from the Blackcap's—builds a differently constructed nest—but with very similarly marked eggs—in nettle-beds and other growing plants in the wood.

The Ringdove and Turtledove choose a high situation for their nest, preferring the branch of a tree as a rule, although I once found a nest of the latter built not more than five feet from the ground in a thick hazel bush. It is not often, however, that these are found so near the ground, and to secure photographs of them, and also of the Jay's, which may be placed anywhere from ten to twenty feet from the ground, some climbing generally has to be done; the photographer must be prepared to go aloft and work with what comfort he can, his ingenuity being called into play in the matter of fixing and arranging his camera.

With such a bird as the Robin it would be



ROBIN'S NEST IN STABLE LANTERN.

difficult to say where his nest may not be found. He seems to have no special preference for any spot in particular, and seems to aim first of all at strict originality in his selection of a nesting site. An old tin can, or kettle, a boot or hat thrown into a roadside hedge, seems to suit his taste. We have heard of him building in flower-pots and paint-kettles, in garden tool-houses, and even in the pocket of a gardener's coat hung up in a summerhouse. These and similar situations seem to suit his eccentric fancy, and curious photographs are shown from time to time of some of these nests. Failing any of these, he selects about as conspicuous a hole in a wall or roadside bank as possible, where all too often the nest and eggs fall a ready prey to the first bird-nesting boy passing that way.

Different localities, of course, provide suitable nesting sites for different birds, and every variety of country must be explored to provide subjects for our camera.

The open moors, downs, and commons must be searched for the nests of those birds that favour such situations. One of the most common nests in such places is the Skylark's, and it is an unprofitable district that will not reward us with one or two of these. Concealed under a tuft of grass, which

often forms a domed top to the nest, we may find the four or five yellowish-brown spotted eggs of this beautiful singer, and in similar spots the Tree Pipit and the Meadow Pipit build and lay their eggs.

The eggs of the Tree Pipit probably vary more in colouring than those of any other of our birds (as the inspection of any large collection will show), and on that account often present some difficulty to the beginner in the matter of identification.

The Wagtails, which, although so dissimilar in appearance, are near relatives of the Pipits, build a very similar nest, although they select quite a different locality ; some, according to the species, preferring the banks of streams or marshy meadows, others choosing gravel-pits or hedge-banks, or the rough corners of farm lands. All of these nests—the Larks, the Pipits, and the Wagtails—will be found to be very similar photographically, and very few of them offer great possibilities in the way of picture-making. A hole in the grass containing four or five eggs will hardly provide the pretty studies that can be made of the nests in banks and hedgerows, although to the naturalist they are all of equal interest and scientific value.

The heath- and gorse-covered commons provide nesting sites for a number of other birds, such as

the Stonechat, the Whinchat, the Linnet, and the Grasshopper Warbler; the nest of the latter species is the most difficult of all nests to find, and may be considered a great rarity by any one who has the good fortune to discover one. Any fairly large clump of furze bushes, if carefully searched during the months of May and June, will be almost certain to reward the photographer with several of the pretty little nests of the Linnet, and as two or more broods are usually reared by these birds, their nesting season is a fairly long one.

The hawthorn bushes and hedges that border most of the fields and meadows contain in abundance the nests of that common bird, the Greenfinch, and occasionally the Lesser White-throat, the Yellowhammer, and the Redback Shrike or Butcher Bird, choose the same situations. There are several very interesting features connected with the life and habits of the Butcher Bird—to give it its most common country name. Its own food, and that which it provides for its young, consists of the larger insects, chiefly humble-bees and beetles, and occasionally small mice and young birds.

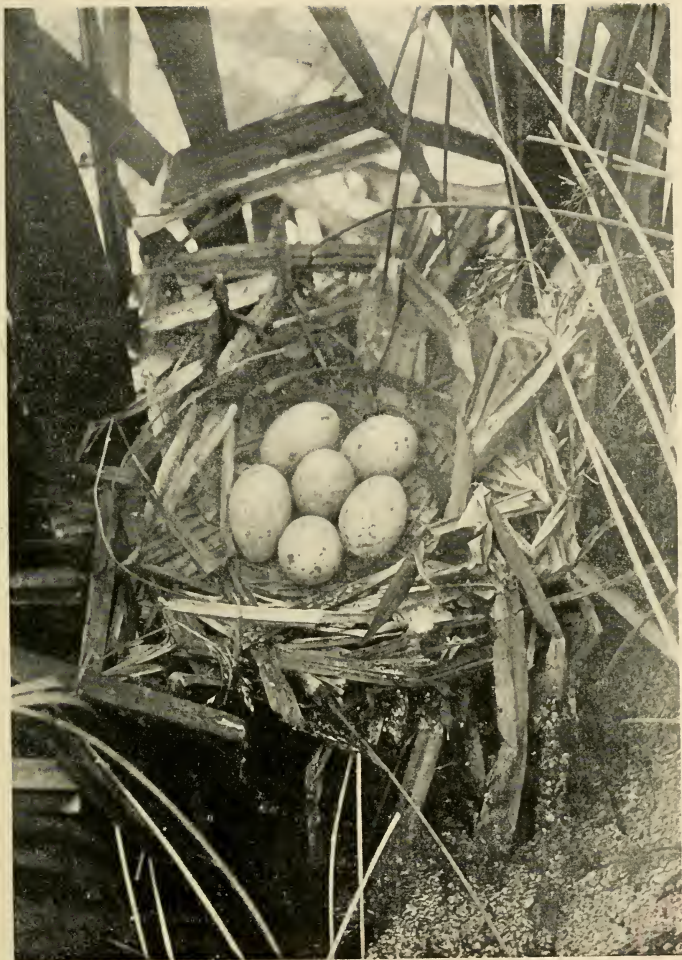
It has a provident, if cruel, method of dealing with these when captured, which consists of impaling them, generally alive, on long, sharp thorns some-

where near the nest, to be ready for future use, and thus provides what is known as his "larder." Although this is a well-known habit of the Butcher Bird, it is not always possible to find a larder connected with any given nest, such birds presumably living, so to speak, from hand to mouth.

To the streams and marshes we must go for those birds that find a home there, and if a spot is selected far away from the busy haunts of men, some good finds of uncommon species may here reward us.

In the rushes and reeds that fill the ditches in such places one of the first nests that we shall probably meet with will be that of the Sedge Warbler, whose deep little nest of dead grass and reeds, and which is lined with the soft down of the heads of rushes, is placed amongst the reeds by the side of the bank or occasionally in a bush at the edge of the stream.

The Reed Warbler, less common than the latter, prefers to build over the water, securely weaving the materials of the nest around three or four of the reed stems, where the nest bends and sways in the wind; yet the eggs in the nest run no risk of being pitched out, so thoughtfully has the bird provided depth of nest enough to allow for this. Along the edges of the stream, or out in a clump



MOORHEN'S NEST.

of rushes in the marshy ground, the Moorhen's nest, formed of coarse sedges and containing from six to eight large eggs, provides a good subject for a picture. The Landrail, the Water-rail, the Dabchick, and many others, including the ducks and waders, favour such a situation—one often offering some difficulties to the photographer, unless he is willing to risk the discomforts of wet feet or is prepared to wade with his camera if no other means are possible of securing his studies.

The Kingfisher's nest, of which nothing can be seen but a hole in the side of the bank, must also be looked for along by the rivers and ditches, although the photograph of one of these must, from the nature of the circumstances, be more interesting than beautiful. This may also be said to apply to many of our woodland birds that place their nests deep down in some hollow tree, the outward and visible signs of which are only the holes by which they enter. The Woodpeckers, the Flycatchers, most of the large family of Tits—including the Great Tit, the Blue or Tom Tit, the Cole Tit, and the Marsh Tit—the Tree Creeper, the Wryneck, and the Starlings, all have this habit, which seems to speak volumes for their intelligence, or at any rate their ideas of security, such nests being, as a rule, well out of harm's way as

regards their natural enemies, and generally equally so from their unnatural enemies in the shape of bird-nesting boys. Photographs of all or most of these should, at some time or other, find their way into the collection of the Naturalist-photographer, as no series can pretend to be complete that does not include a representative number of these nesting sites. Some difficulty may at times be found with those that are situated at some height up from the ground, and in such, if photographed in the ordinary way, the entrance holes would be but very small in the picture. By using, however, the single combination of an R.R. lens (to be described more fully later on) these are generally brought more within range and large enough for our purpose.

While in the marshes it would be well to try to find a nest of the Plover, or Lapwing as it is generally called. These may be as often found on ploughed or fallow fields, and in such situations, although laid on the bare ground without any concealment and with little or no apology for a nest, are about as difficult to find as can well be imagined. A natural hollow in the ground is usually selected, which is lined, or rather littered, with a few bits of straw or other rubbish, and thereon are placed four richly marked and blotched

eggs which, from their colouring, so accurately match the appearance of the stones that lie around that it needs the most careful search to detect them, and often if the eyes are taken off them even for a



EGG AND CHICK OF LAPWING.
(Showing adaptation of colour to environment.)

moment, it is some time before they are again seen. In approaching nests of this species, which I have known, I have used the greatest caution, and still have often walked right past the spot, although carefully marked, and sometimes have only passed at a few feet distance. The illustra-

tion showing an egg and chick of this bird will, perhaps, convey some slight idea of this resemblance to their surroundings, although it is obvious that within the limits of a small photograph objects must be very much more conspicuous than when surrounded on all sides by countless other objects which they so nearly resemble.

The eggs of another bird (and there are many other examples besides, especially on the sea-shores) that are similarly protected by their resemblance to their surroundings, although in quite a different situation, are those of the Kentish Plover, which are laid on the bare stones of the beach, at various spots around the Kentish coast. This is possibly one of the best examples to be found of Protective Colouration, the richly marked eggs so beautifully imitating the speckled and blotched stones amongst which they are laid. There is no semblance of a nest provided, and, as may be supposed, it is a matter of extreme difficulty to find these eggs among the bewildering environment of some acres of these beach stones. I well remember a morning spent a year or two ago in search of a nest—if we can call it so. A party of three of us visited a spot where the birds breed. Several pairs of birds were there which we carefully watched with field glasses, and having

marked them down, or seen them rise, time after time we carefully examined the spots and some distance all around, quartered the beach and



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EGGS AND NESTING SITE OF KENTISH PLOVER.

searched carefully to and fro, but failed entirely to find the eggs, although from the behaviour of the birds we felt certain that eggs or young were somewhere about.

Other cases illustrating this theory of Protective Colouration will be met with in the somewhat common nests of the Chaffinch, and often the Goldfinch, while in these cases it seems to be deliberately practised by the birds for the purposes of concealment. When these nests are built in the fork of a tree (and it is not invariably so, the former species, as often building in a bush or hedgerow) the bird seems to select with great care materials for the outside, which generally consists of a covering of lichen, that will accurately resemble, or at least harmonise with, the general appearance of that part of the tree. Whether this is a conscious act on the part of the bird, which I think we can hardly doubt, or not, the fact remains that such nests do beautifully resemble the tree to which they are fixed, and often, although placed in most conspicuous positions by the roadside within easy view of every passer-by, they frequently remain unmolested, while many more carefully hidden ones come to grief during the general plundering of the countryside.

The foregoing may be said to be the commoner nests and the ones more likely to be met with by the photographer during his first few seasons. With many of these, until he has acquired some knowledge of the subject, he will at times ex-

perience some slight difficulty in the matter of their identification. It is here that the value of his books on the subject will come in.

In meeting with a nest with which he is not familiar, besides his photograph, which if he secures a good one will give him a good general impression of it, he should also make notes of the situation and position of the nest, the materials of which it is formed, the approximate size, colour, and markings of the eggs, and the form and plumage of the bird if seen. These data, if placed in the hands of a more expert ornithologist, will enable the latter, as a rule, to determine the species, or will form a sufficient guide for tracing it out for himself in his book. The general practice of taking a single isolated egg—which may or may not be a typical specimen—for identification is much less satisfactory and certain.

It is hardly, perhaps, necessary to mention that nests should never (if it is by any means possible to avoid it) be removed from their original situations for the purposes of photography, as nests photographed absolutely *in situ* are far more valuable as studies and as indicating in some measure the habits of the birds themselves.

ON PHOTOGRAPHING BIRDS.

Besides the nests and eggs, the young birds in the nest, or perched on a twig, the parent bird on the nest, or engaged in feeding the young, should be photographed, as these make even prettier and more interesting studies than the nest and eggs alone. In coming to this branch, especially that dealing with the full-grown birds, we are approaching a subject infinitely more difficult than the work we have been considering, as may be easily imagined. With the nest and eggs alone we are dealing with a subject that will allow of almost any amount of leisurely care being taken, in preparing the camera and in the setting of our subject, while our exposures may be as long as is necessary for the lighting of our subject, unless we happen to be troubled with movement caused by the wind. But when dealing with such restless, nervous creatures as the young or the birds themselves, facility of movement and short exposures are often necessary to success, to which is added a good deal of chance in getting our subject in the right position and in making the exposure at the correct moment. With young birds in the nest no very great difficulty will be found, provided we are working in a fairly good light. But for

these a somewhat short exposure is always necessary, say, from one-fifth to one-tenth of a second, according to the behaviour of the birds, as there will always be found to be some movement, their breathing alone keeping their little bodies in almost constant motion. If the young are not yet old enough to take flight, and the nest is carefully approached by gentle movements, by carefully arranging the camera and adjusting the surroundings, any number of interesting studies may be obtained, trying different points of view, with different effects of lighting and with varying exposures. The prettiest studies of all are obtained when the birds are getting nicely fledged, say, from about a week old, according to the species, although a series showing them at different stages of growth from the first day of hatching to the time when they are ready to fly would be most interesting and valuable and worth more than a far greater number of single studies of different broods. There are several difficulties, however, in the way of obtaining such a series as this, the greatest of which seems to be that of finding a nest in a spot photographically suitable and yet secure enough from the reach of the nest-robbers who infest the country at this season of the year, and destroy eggs or young in apparently every nest they meet.

But if such a nest in a well-protected place, such as a garden or orchard, can be found, at an accessible distance for the photographer, and in a spot suitable for photographic work, I can think of no more interesting set of studies than this—one that would well repay the photographer for his time and trouble.

In photographing such a brood the camera is arranged as for our other subjects with regard to the suitability of the lighting and in choosing the position, height of camera, and distance from the nest, that will give us the best view of the young. The largest stop that will give satisfactory definition is used, and the shutter worked at a speed no faster than is really required, so as to give as full an exposure as possible.

When the birds are a little older and just before they are fit to fly, some pretty studies can be made by arranging them on a branch, singly, and by twos, threes, or more. For this task some amount of patience is necessary in posing our little sitters, as considerable care must be used in handling such delicate little creatures. They must also be about the right age (within certain limits) for the operation, which age is only determined by the species, some birds growing in size and strength much more rapidly than others. If taken from the nest

too young we shall find that they are too weak to perch on the branch and sway backwards or forwards, losing their balance and falling off. If this is found to be the case they should be put back into the nest for a day or two, as no methods that savour of cruelty or that expose our subjects to any risk of injury should ever be used. If, on the other hand, they are left too long, until the birds are too old and have become "flyers," the obvious difficulty is to get them to remain on the branch at all. Supposing, then, that we meet with a brood that are about the right age for our purpose, a little care and patience should reward us with some pleasing pictures. A suitably sized bough in a well-lighted position, and if possible near to the nest, is chosen, the camera is then set up and focussed roughly, and the dark slides are laid handy. If our subjects prove to be good, quiet sitters, it is sometimes possible, after they are arranged, to focus correctly, set the shutter and insert the dark slide, while they are in position. If they should prove to be too restless for that, the only plan is to place something on the bough in the position they are to occupy, focus on that, stop down the lens (as little as will be found necessary to cover the subject) set the shutter, insert the plate-holder, and draw the slide all ready to make

the exposure, the pneumatic bulb hanging close at hand, so that when arranging the birds the exposure can be made the instant a favourable opportunity occurs.

The birds are now carefully placed upon the bough one at a time, care being taken that the first one is quietly and comfortably settled in position before we attempt to place No. 2. It is certain that some amount of struggling and fluttering will take place at first, but after allowing the bird to grasp the support fairly, and assisting him to get his balance, let the hand remain around and just touching him, especially over his eyes, until he is perfectly still and quietly settled, when the hand can be very slowly and gradually withdrawn, and he will in most cases remain quite still and contented. This operation may take a minute or two with each, sometimes more, but if it is successful at all birds so placed will remain in position for some time. I have had such a row of birds quietly sitting for ten minutes or more, while I freely moved the camera about changing positions, during which time I made several exposures on them.

But in the generality of cases they will be found to be more restless, and considerable care and patience must be exercised before we can get a

chance to make an exposure. If we aspire to photographing the parent birds on the nest or engaged in feeding and attending to the young, we must be prepared to find our task infinitely more difficult than anything we have yet attempted. It is sometimes possible to come upon a bird possessed of an unusual amount of confidence, which, having placed its nest in a most conspicuous position, calmly and contentedly sits fast on its nest and views with apparent interest any passerby who keeps at anything like a reasonable distance.

It is such birds as these that will sometimes give us the opportunity of getting within photographic distance and making an exposure or two if a certain amount of tact is used. If the camera is set up and prepared at a distance and is then *very* carefully and by slow degrees brought up without any hasty movements likely to alarm the bird, it is sometimes possible to get a picture or two without the elaborate preparations that are usually necessary for this work.

It is a good plan in such cases to use one of the single combinations of our lens, which, forming a long focus lens, as a rule of double the length of the complete lens, enables us to work at a much greater distance, or, what amounts to the

same thing, to get an image on our plate of about twice the size that we should do if using the complete lens. The one disadvantage of this plan is that when using the single lens the stop values of it are thus halved, $f8$ stop then working at $f16$, $f11$ at $f22$, and so on, the exposures thus required being four times what would have otherwise been given. But if our bird is still, which it will be if it stays at all, several seconds' exposure can be given if necessary, and as these exposed nests are almost always placed in open or well-lighted positions, a very long exposure will not be required. It is only on birds that are bold enough to build in open situations that we shall be able to operate in such a manner, as any bird that chooses a dark and well-concealed spot for its nest is always much too wild to permit of any such tactics.

We have probably all seen many illustrations of wild-bird photography, depicting birds far too wild for any such methods just described to have even the most remote chances of success. For such as these, as well as for the practice of bird photography in general (other than in a chance, casual way) far more elaborate preparations must be made and much greater ingenuity exercised. Those who have read any of the works of the

Brothers Kearton, Messrs. O. G. Pike and Lodge, are acquainted with the many ingenious contrivances used by these clever and energetic workers, who have so highly specialised this branch of Natural History Photography and who have produced such wonderful and valuable results.

For the benefit of any who are not already acquainted with their methods, some of them are briefly as follows: For photographing such birds as build and rear their young in bushes and hedges the camera and its operator are concealed within an artificial tree-trunk, which is a hollow structure of canvas, supported on a light cane framework, the outside carefully painted in imitation of a tree-trunk, to which branches of trees and sprays of ivy are attached to give it as realistic an appearance as possible, a hole in the side being provided for the lens. This structure is then gradually moved, a few yards at a time, at intervals of perhaps some hours, nearer and nearer to the nest until it is close enough for photography, when the camera and the operator are placed inside, the opening carefully closed up, and the photographer waits and watches for the return of his subject, which in most cases is readily deceived and comes back freely to its nest.

In the case of ground-building birds, such as Skylarks, Pipits, &c., a different structure is used. An umbrella is taken and opened and canes are tied to the ends of the ribs so as to stand it up some three feet or so from the ground. The outside is covered with holland or similar material, and over the whole of it straw, hay, and rubbish is placed and fastened into position, the whole forming what they call an "artificial rubbish heap." This also is gradually advanced a short distance at a time nearer to the nest—this operation, it is said, taking in some cases a day or two to perform—until when near enough the photographer takes his position inside with his camera.

These two contrivances have been used by the Brothers Kearton, with what success some of the beautiful illustrations to their books conclusively show, and to any reader who might wish to learn more of the details of these structures and how they are used, I would strongly recommend a study of some of their works.

Other methods have been described by different workers, such as concealing the camera in a heap of rubbish which is gradually moved nearer to the nest, the photographer hiding some distance away, with a long tube reaching to the pneumatic

shutter by which he makes the exposure. There are, however, two great objections to this plan. The photographer is in most cases too far away to be able to watch his subject, and also the bird must be disturbed from the nest every time he goes to change his plate. One very ingenious method has been described and used by certain workers, by means of which the bird is made to actually take its own portrait. A bait is laid for the bird or a spot is selected for him near to his nest, and the branch on which he is required to pose is connected with the camera shutter by means of an electric wire. The camera has been previously arranged and focussed and everything made ready in the way of its concealment, the lens covering the selected area. When the bird eventually returns and settles upon the branch his weight completes the circuit, the shutter is released, and the photograph taken. Pictures have been published showing the results obtained by this very novel if somewhat laborious method.

I have also seen the suggestion that a brood of young ones may be placed upon a twig near the nest, when, after arranging the camera, the photographer should take up his position and wait for the parent birds to return and feed the young.

And also that if a bait is placed upon a favourite perching branch of a bird, opportunities may be had of exposing a plate upon it. But I must say I have my doubts about it, and I certainly think that feasible as these methods may sound (to some) in practice they would be found to be entirely unworkable, without a very great deal of preparation in the way of disguising the camera and hiding the photographer.

The methods just described of course relate to the photography of birds in their natural haunts—"Stalking photography" as it has been called—but there is no reason why some success and a good number of excellent studies should not be made dealing with the birds by the "Control" or "At home" method. In fact, it should be possible to get even more successful studies of the birds themselves, showing their form and the markings of their plumage, and in a position where we have control of the lighting of our subject. For this purpose some form of glass case with a suitably arranged background would be prepared with branches, &c., inside, to give it as natural an appearance as possible, and such birds obtained as are usually sold as cage-birds—Linnets, Goldfinches, Bullfinches, Greenfinches, Yellowhammers, or, in fact, any other suitable bird which, if reared

in captivity, would prove to be a quiet and ready sitter.

It would, of course, be impossible, not to say



YOUNG ROBIN.

cruel, to put into such surroundings any bird freshly taken from its wild state, nor would this method, with its limitations of realism, answer for more than a limited number of our wild birds, yet

for such birds as have been suggested it should offer possibilities of obtaining an interesting series of pictures. The young Robin in the illustration, showing his infant plumage, the spotted breast, and also the picture of the three Linnets were obtained in this way. Such a method will, of course, not commend itself to those workers whose chief object in Natural History Photography is the photographing of wild creatures absolutely under their natural conditions, where their habits can be watched and recorded and the resulting pictures produced in illustration of their behaviour when entirely free from restraint and observation. Yet those workers who have the ability, the time, and the patience necessary for such work are but few indeed, while there must be many who would welcome some—to them—more workable plan by which they may secure studies illustrative of the wild life of the country.



"IN THE MEADOWS."

PART III

ZOOLOGY

ON PHOTOGRAPHING REPTILES.

IF the photographer is desirous of obtaining studies of as many of the wild creatures as come in his way (so far as his opportunities allow) he must be prepared to devote some of his time during the spring to the photography of the reptiles and amphibians, as it is then their breeding season also, and it is during this time that they are most interesting to observe as well as easy to obtain.

Let us consider first of all the reptiles proper, which comprise the snakes and lizards. It will be at once realised that some method of photographing them at home will be far easier and will put much greater possibilities in the photographer's way than any attempts to track them down in their native wilds, and secure pictures of them

before they are able to make good their escape. That it is quite possible to come upon a snake asleep or basking in the sun and to photograph him without disturbing him I do not deny, but that a really satisfactory study can be so made of him I do not admit, for two or three reasons. He will be almost always found lying in the brilliant sunshine—a condition of lighting altogether unsuitable for picturing his shiny, metallic appearance, and also the coiled-up position that he then favours makes it impossible to show his true form properly, while his tail, one of his most distinctive features, is almost always hidden amongst the coils of his body. By far the most satisfactory way to photograph such a creature is to prepare some form of box in which he may be dealt with at home. A rough case, of no great depth, should be taken and prepared by plastering the bottom and sides and rounding up the corners with some composition of a neutral grey colour. As good a mixture as any consists of ordinary builder's cement mixed with earth and stones and made up into a plaster about as thick as mortar. If of too light a colour, it may be slightly darkened by the addition of a small quantity of dry lampblack, but care should be taken not to make the mixture too dark in colour—in fact, it is rarely necessary to add any

colouring matter, as only a small quantity of the cement will be required. After plastering the box and allowing it to dry, a little loose earth and stones may be lightly scattered about and clumps of grass and plants added where thought necessary, which are changed for fresh ones and altered in



GRASS, OR RINGED SNAKE.

position according to our different subjects. A glass front is provided, which should slide in grooves, so that it may be removed in the case of those subjects which do not require it. Such a case will be seen as No. 1 in the illustration (p. 45).

Our snake—in this case—is placed inside, a plate of glass is laid over the top, and some time now given him in which to settle down.

After an hour or two he will be found to have quieted down, and amidst his writhings and twistings will at times have short periods of complete rest, when a second or two's exposure can, if necessary, be given. The camera should not be pointed down perfectly straight on to him, but should take him at an angle which, if the box is not more than about eight inches deep, will be found quite possible from any side, while to take a view of him through the glass front with the camera almost level will often give a more natural result. The common grass snake is perfectly harmless, and may be freely handled without fear, although at times he hisses fiercely and does his best to appear a very terrible creature. His only apparent means of defence seems to be a very offensive smell that is poured forth when he is first captured, but in captivity he soon loses this objectionable habit. If kept for a short time before we attempt to photograph him, he will become quiet enough for us to be able to dispense with the glass cover of the box. This is a great advantage, as with it we remove the troublesome reflections that are always present if we attempt to photograph



VIPER, OR ADDER.

through the top glass out of doors. If the top glass is found to be a necessity, it is better to photograph him indoors near to a large window, where the sky cannot be reflected on the top glass.

In photographing the Viper the same case and surroundings may be used, but in this case great care must be taken in handling the specimen, on account of its dangerous bite. Although not so deadly as popular notions would have us believe, still it is not a subject to be trifled with, and no photographer should run the risk of handling it without having had some experience in that way. Grass snakes may be readily obtained in the spring in most districts, along the banks of marshy streams or in damp, low-lying woods, and may be easily distinguished from the Viper (although the locality in which found is usually sufficient indication) by one or two distinctive features. In the snake the general colouring is of a greyish olive-green, without any very distinct markings on the back, but with dark, short bars or stripes around the sides. Just behind the head is a yellowish ring or collar, behind which is an uneven black patch or ring, and, most important of all to note, is that it has a long, thin, tapering tail.

In the Viper the head is flat, slightly broader,

and more arrow-shaped ; it has no ring around the neck; and it has, by comparison, a short and quite stumpy tail. Its general ground colour varies very much. Some are of a light greyish colour, others much darker and of a brownish tint, but all have, more or less distinct, a much darker zigzag line right down the back. This is, as a rule, at once recognised, and easily denotes for us the species. These characteristic features should always be clearly shown in our negatives, as on their distinctness the value of the photograph depends.

One of our common lizards, the Slow-worm, is to all appearances a snake, although in reality a legless lizard. This creature, which possesses with the other lizards the curious power of being able to cast or break off its tail, must be on that account at first handled with care. When pursued or alarmed the lizards will often snap off their tails, which wriggle on the ground while their late owner makes good his escape, so that when searching for specimens it is a good plan to either wear a soft glove or to hold a handkerchief in the hand when taking them up. This curious result of fright is soon, however, overcome, and when in captivity and handled with care they show no desire to part with any portion of their anatomy. It is, of course, difficult in photographing any such creature

to suggest its actual size or by comparison with anything else to give scale to it, our photograph as often as not conveying no idea as to whether it is one foot, three feet, or even more in length.



SLOW-WORM, OR BLIND-WORM.

The specimen in the illustration was about fourteen inches long, which is the average size. The slow-worm has no conspicuous markings, but is of a general bronze colour and of a very bright metallic appearance, making him rather a difficult

subject to photograph in a bright light and wholly impossible in sunshine.

The common lizard, a restless, nimble little creature, must be provided with a smaller glass case for the purposes of photography, such a one as that marked No. 2 in the illustration, in which



COMMON LIZARD.

he can be photographed from either side, being suitable.

Both of these lizards may be found in early summer on hot, dry, gorse-covered commons, and often give the would-be captor no small amount of trouble to secure them.

There is another and rarer species, the Sand

lizard, rather larger than the common variety. It is, however, only found in certain districts.

A section of the reptiles known as the Amphibians, which comprises the toads, the frogs, and the newts, are, as the name of their section indicates,



FROG.

partly aquatic and partly terrestrial in their habits. Their life-histories make them perhaps the most interesting class of animals we have, undergoing as they do a wonderful metamorphosis or series of changes, from egg through immature form to the perfect state, affording material for much interesting study and photographic work.

The eggs of the Frog, which appear as a number of small round jelly-like masses, each enclosing a dark speck (which is in reality the egg) and formed together into a cluster, are deposited in some pond or ditch from about the middle to the end of



TOAD.

February, and must be familiar to every one. Those of the Toad, which appear a week or two later, are laid in long double strings which are wound about amongst the water weeds. These eggs hatch in due course and produce the tiny creatures known as tadpoles, which at first are rather shapeless and show little or no signs of life,

but hang suspended by the suckers, with which the underside of the head is provided, to the water



EGGS OF FROG.

weeds. Breathing at first by means of gills, and with a head that gradually increases in size, they

become in about a week free swimming creatures. In from three to four weeks a pair of hind legs gradually make their appearance, their front legs following shortly after. The body is now developed and the tail is gradually absorbed, lungs being now



EGGS OF TOAD.

provided for atmospheric breathing, until at the end of about twelve weeks the young frog has assumed the perfect shape of his late parent—although of a very much smaller size—and he is now ready to leave the water and to spend a great part of his existence on land.

This series of changes, which progresses by gradual and easy stages, may be watched in detail at home by collecting a few of the eggs and keeping them in a fairly large aquarium.

Some difficulty is experienced in photographing the tadpoles in their later stages, as they are



FROG TADPOLES.

creatures of a small size and of a restless disposition, making a short exposure in a good light necessary.

For this purpose a shallow glass tank (as shown in No. 3 in illustration, p. 45) is required, a plate of glass inside keeping the tadpoles close up to the front so as to secure evenness of definition on the negative. The later stages may be photographed,

showing the young frogs on the bottom of a gravelly pond, which is managed by placing a layer of sand and an inch of water in a large size developing dish. The adult specimen may be either accommodated with a tank built up in imitation of their natural surroundings or photographed on dry land in the case used for photographing the snakes.

The difference, in the adult form, between the warty appearance of the toad and the smoother skin of the frog, as well as the variation in their general form, should be shown in our photographs.

The Newts, whose life-histories are very similar to those of the frogs, should also be photographed in detail during the different stages. Their eggs are also deposited in spring in the water of some stagnant pond, but are very rarely seen, as they are laid singly, and each one wrapped carefully in the leaf of some water plant, the water starwort for preference. It is only in the spring-time of the year that these animals are to be found, as after the breeding season they leave the water and amongst the vegetation of the fields during the rest of the year are but rarely met with.

The male of the Great newt is really a very beautiful creature, with a comb-like crest along the whole length of his back—which, however, quite disappears after the breeding season—and



FROG TADPOLES WITH LEGS.



GREAT NEWTS, OR TRITONS.

with a bright, orange-coloured waistcoat thickly spotted with black. His mate has no crest, but is a good deal larger in size.

The Smooth, or common newt, or eft as it is called, is much smaller than the former, but is even more richly coloured, having splashes of blue along



COMMON SMOOTH NEWTS.

his sides and tail. It is also found at the same time in the same situations, the difference in the sexes again being marked by the crest and the richer colouring of the male.

For photographing these our tank again comes into use, the bottom being prepared as a miniature rockery, in imitation of their natural habitats. These creatures pose well and give the photo-

grapher opportunities for short time exposures, first allowing them time in which to get settled and to take up their own positions.

No difficulty will be found in obtaining specimens of either tadpoles or newts, which may be kept at home for a considerable time if provided with a large tank and plenty of the weed from the pond or stream from which they were taken. The water should be changed at intervals, and fresh supplies obtained from their own or similar ponds.

For photography they are removed from the larger aquarium to the shallow tank, the glass of which can thus be kept quite clean, and fresh, clear water used, as this will be found of great importance in lessening the exposure required.

Specimens of newts are easily captured with a net, or if the pond is a large one and it is difficult to get within reach, they may be caught by fishing for them. A couple of worms are taken and tied a few inches apart to a long thread. These are thrown out into the pond where the newts are seen to rise for air, and in a short time some sport may be expected. A newt will soon be seen to take the bait, or if the water is thick the angler will see by the snatches of his line when he has a bite. After a number of snatches at the worm the

newt commences to swallow it, when, having allowed him time to get down a good portion of it, the thread with the newt usually hanging on quite fast is drawn in and landed.

Small fish, beetles, and other forms of aquatic



STICKLEBACKS.

life also make most interesting studies and specimens, and can generally be obtained from the ponds and streams of every district.

In the case of sticklebacks and such other small fish as can be obtained, a short exposure is required and a number of pictures taken, from which the best groupings are selected.

In the matter of water beetles, water scorpions, water boatmen, snails, leeches, and other aquatic creatures, a very great deal of interesting work still remains to be done in this almost untouched branch of Natural History Photography.

ON PHOTOGRAPHING ANIMALS.

In dealing with the photography of animals, a common experience seems to be that our first difficulty, and often our greatest one, is that of obtaining specimens to deal with.

The list of our native mammalia is short indeed, and to this unfortunate circumstance is added the fact that many of those we do possess are already or are rapidly becoming very rare, while all are exceedingly shy and mostly nocturnal in their habits.

On this account such animals as the badger and the otter, not to mention several others whose names have become merely a memory, also the fox and the hare may almost be entirely dismissed from the possibilities of the average worker, while stoats, weasels, squirrels, and even moles and hedgehogs, although not by any means uncommon, are not to be met with, or secured, any day. It must, at some time or other, strike all Naturalist-



FIELD OR WOOD MOUSE.

photographers as not a little disappointing that so little wild life in the form of animals is met with during the course of an average country ramble. Occasionally—and very occasionally too as a rule—one is treated to the momentary vision of a rabbit or a weasel, a vole or a squirrel, as it flits across our path diving out of one hedge into the other, while the photographer pines for a closer acquaintance with them. The town dweller is, in fact, hardly ever likely to come upon them himself at all, and it becomes necessary for him to obtain the specimens he requires either from some one in the country or through those who supply them as a matter of business, and it is to these means that many photographers are reduced for obtaining specimens to photograph. In the cases of the common Rat and Mouse, however, the reverse is only too often the case, and we can generally obtain specimens of these with little trouble.

In dealing with the Rat, some form of box or case is obviously necessary, and can as a rule be easily made by the photographer himself.

Although possibly something simpler might be contrived I will describe the one I have found convenient for this and other purposes.

A small packing case is required some 2 feet wide, 18 inches high, and 1 foot or more from back

to front. This is prepared as before by rounding up the corners and angles. A glass front is fitted in, a glass for the top provided, and a third plate of glass fixed about midway between back and front so as to keep our sitter somewhat within bounds, any plants or other accessories that may be considered necessary being placed in the back portion. The front and middle glasses are secured by sliding down into grooves from the top, which are formed by tacking on thin strips of wood. The top glass or glasses (and it is better to cover the front and back portions by separate plates of glass which can be removed separately at will) must be very securely fastened, which can be safely done by means of four or six screw eyes. These are turned into the woodwork until the ring part just gently but firmly clips the edges of the glass and holds it tightly. To unfasten them, a half turn to each of the screw eyes allows the glass to be at once removed, and when replaced a half turn again holds it in position. A small sliding door is also provided at the side to enable us to get our subject into the case and out again into his cage if necessary.

A full-grown rat being an animal savage by nature and generally rendered desperate by being cornered, as well as being an adept at making his

escape, a few hints as to the safest and easiest method of dealing with him without the necessity of handling him, and by which any risk of his escape is reduced to a minimum may not be out of place. Having secured him in a trap of some kind alive and uninjured, the next move is to



COMMON BROWN RAT.

transfer him to the case prepared for photography. The method of doing this depends to some extent upon the form of trap in which he is secured, and particularly of the door. In some cases it is possible to slide back the top glass, open the door of the trap, and so drop him in, the glass being instantly and securely fastened in position. A

safer plan is to introduce him by the sliding panel in the side. This panel, which should slide freely, is raised, the cage with the animal placed opposite to the opening and a short tunnel of cardboard or other material made to connect the trap with the opening. One end of the tunnel must be made large enough to take the end of the trap and allow the door to open freely into it, the other end should taper to just about the size of the opening in the case. When all is ready the door of the cage is opened, and as a rule the rat needs no second bidding to escape from the trap, only to shortly find himself in another prison.

The panel is quickly lowered into its place and fastened, and he is secure.

If after securing the first series of photographs it should be found desirable to postpone operations till another occasion, preparations must be made for securing him in some safer quarters, as any animal possessed of his gnawing powers is not to be trusted in a prison with thin wooden walls. For this purpose a tin box should be obtained—a biscuit tin or similar box answers well—a portion is cut out of the lid and a pane of glass fixed in by soldering on strips of tin to form grooves. A hole with a sliding panel of tin—prepared from the piece cut out of the lid—is provided in the side

of the box which slides into grooves also formed by strips being soldered on. The lid can be kept in place by a piece of wire bound round the box. Food and water should be placed in the box before the rat is turned into it. The tin box is



COMMON HOUSE MOUSE.

now placed close against the side of the wooden case, the two panels coming together just opposite each other. These are raised together and the rat allowed to find his way into the tin box, when that panel is at once lowered and secured in place. By this means I have kept rats for days and mice for weeks, transferring them from the box to the

case and back again as often as necessary to feed or to photograph them.

Having now turned our animal into the case and fastened the door, the fun begins.

This method of procedure must, I am sure, sound delightfully easy to any one who has not yet tried it, and must appear as though it were possible to get a good result every time. But a few trials will serve to undeceive any one holding that opinion, as there is still ample scope for failure. In proceeding to photograph our subject, a part of the case is selected in which we wish him to take up his position; that part is carefully focussed, the dark slide and shutter made ready, and we must then be prepared to watch and wait until our sitter chooses to take up his position within the selected area. It is certain that he will come to or near the spot a dozen or twenty times, without giving us a chance to make an exposure on him. At such times he may not be in a nice position—his back may be towards us, his feet not showing, his tail concealed, his eyes shut, or in any position but the one we wish for.

But it is very little use to release the shutter until we get a satisfactory pose, one that shows the points or distinctive features of the animal,

when, if we are ready to seize a momentary pause in the right position, the plate is exposed and we may—or may not—have secured a successful study. The size of stop and speed of shutter is best decided by the result of our first exposure, but as a rough guide for such a subject, one-fifteenth second at *f*11 with an extra rapid plate in a good light should give us a well-exposed negative.

The common mouse will be found to be a much more trying subject than the last, partly on account of its smaller size and partly because it seems to be possessed of even greater restlessness. Some time should be given to all such animals after first putting them into the case to accustom them to their new surroundings and to allow them to settle down somewhat, their behaviour when first there alternating between sticking tightly in a heap into some corner and restlessly rushing to and fro from side to side, or climbing the sides of the case. It is unnecessary to say that no attempt can be made to photograph them until they choose to rest for a second somewhere about the spot on which we have focussed the lens. One good study and a couple of indifferent ones are good results out of a dozen exposures.

Field mice and voles can be dealt with in the same way as the foregoing, suitable alterations

being made in the matter of their surroundings, so as to give as natural an effect as possible,



FIELD MOUSE.

according to each individual's habits. With mice of course, a smaller case is used than that described for rats, although it may be constructed on the

same lines. For field mice such a case as No. 2 in the illustration as used for the lizards will be found convenient, or No. 5 built on the same plan as the larger. We have seen pictures of voles actually taken out amidst their natural surroundings, and although the object itself is, as a



HEDGEHOG.

rule, of a very small size in the picture, yet the difficulty of obtaining studies of such wild, cautious creatures, at such short range puts the task far out of the reach of the ordinary mortal, who is only possessed of the average amount of human patience. To sit as may be necessary, even with this "captive" method, with the shutter bulb in

hand for an hour at a stretch, waiting for or trying to induce an animal to take up a suitable position, and on development to find our negative a failure, is more than enough to tax the patience of most of us.

In dealing with such an apparently easy subject as a Hedgehog, our patience is often sorely tried by habits that are the exact opposite of the foregoing.

It may be that when we wish to photograph him he is by no means anxious to gratify our desires, and instead of walking around and showing himself he calmly rolls himself up and goes to sleep for an hour or two in the middle of the sitting. No use to poke or push him to try and induce him to pose for us, he merely rolls himself the tighter and defies our efforts, and we are compelled to wait his pleasure absolutely.

But while waiting to make an exposure on an animal of any kind, how many extremely interesting ways and habits we observe that would not at other times be seen at all. Many little mannerisms are noted then that reward the photographer for his frequently long waits.

One cannot fail to notice, for instance, points of similarity between the pig and the hedgehog, the "routing" movements of his snout and his little

piggish grunt. See him, too, as he scratches his ear with his hind foot, just like a dog. No, the time is not all wasted as we sit bulb in hand ready to take advantage of some momentary pose.

A few years ago I had the somewhat unique



BADGER.

opportunity of photographing what may be considered something of a rarity—a tame Badger. I have since never ceased to regret that I was not able at the time to take full advantage of such a fortunate circumstance by securing some good Natural History studies of the animal. I certainly secured a few snapshots, one of which, showing

the animal surrounded by dogs, is given in our illustration, and although possibly interesting, it is only so as a curiosity on account of its unusual surroundings and companions, not as a study of the animal itself. Being very restless in its habits, and having full range of the whole of the farm premises, it seemed impossible to confine him to one spot for any time without the expedient of offering him food, which consisted of bread and milk and fresh eggs, which he appeared to greatly enjoy. Several exposures made under more natural conditions all proved to be failures. This animal was secured when young, and, although very vicious and savage by nature, was made comparatively tame. He seemed to be allowed a considerable amount of liberty about the farm sleeping with the dogs and proving himself to be an inveterate egg-stealer. He answered to his name readily when called, and few more ludicrous sights can be imagined than this awkward creature, lumbering along after a lad on a bicycle, just as a dog would follow when called. Although tame to a great extent, yet his vicious nature showed itself whenever he was teased or roughly handled by a savage display of teeth and claws that frequently left their mark.

Occasionally one may have the good fortune to

come upon a Mole aboveground, from some cause having lost his bearings, or having ventured upon a spot where the soil is too hard for him to burrow instantly on being discovered, and we are then able to secure him. Whether armed with a camera at the time or not, by far the easier plan is to take him home and deal with him in the case used for snakes, &c. Nothing is to be gained by attempting to photograph him where found, and a deal of trouble and probable disappointment may be saved by restricting his movements in a case of some kind. A Squirrel is far easier to obtain from others than to catch for oneself, and should form a most interesting and beautiful animal for a series of pictures for which something special in the way of a large glass case would be required with surroundings in imitation of his natural habitat. Similarly a wild rabbit, although apparently a most unsuitable animal to place in captivity, could be managed by securing a young specimen and keeping him until large enough for our purpose.

Another awkward creature to deal with successfully is a Bat, his retiring modesty, especially in the daytime, causing him to betake himself into the farthest and darkest corner of whatever receptacle he is placed in, efforts to draw him out only resulting in his snarling and snapping and showing

his rows of little teeth. In the corner he is nothing but a little shapeless heap of skin, and some means



HOW A BAT SLEEPS.

must be found of inducing him to stay out long enough for a photograph. The way in which he sleeps hanging head downwards is one of his many peculiarities.



DORMOUSE AND NEST.

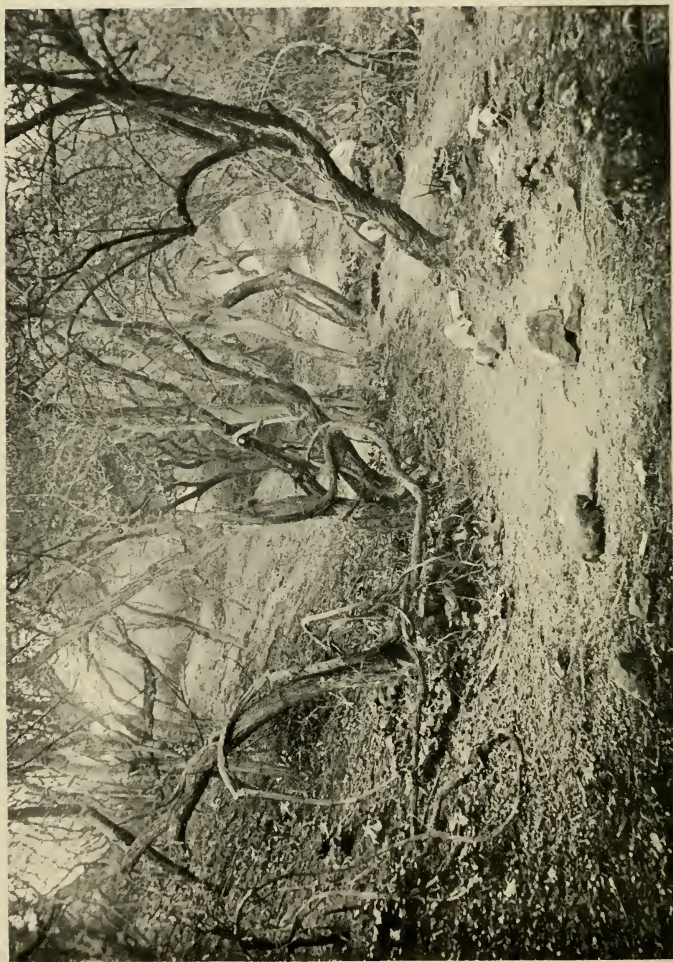
The Great bat, the Long-eared bat, and the Short-eared bat are the commoner species, and one or other of these are sometimes to be found by day fast asleep in some stable or outhouse. I once took one of the latter species, when out mothing, in a butterfly net, as he swooped down close to our heads.

If we chance to come upon a nest of one of the mice of the field and hedgerow, such as the Dormouse, the Woodmouse, or the Harvest mouse, it follows that these should be photographed *in situ* and not disturbed.

The Dormouse's nest in the illustration I met with during my first year's work, and being unacquainted with it I wondered whatever bird could have built such a funny nest. Putting in one finger to feel for the eggs and touching something soft, I was surprised on withdrawing it to see the little nose pop out. I had just time to make one hurried exposure and was moving to get a second position when out came the little furry occupant and was gone. There are many other creatures of the field and hedgerow that will well repay a little attention from the photographic Naturalist, who, unlike the average man in the street, does not despise the lowly or common forms of life, but finds in everything large enough

for his purpose something of interest and worthy of his best efforts.

A walk along any of our hedgerows in the autumn will discover large numbers of the beautifully coloured and banded shells of the common snails, many of which are worth a plate or two, the body of their owners being shown in the picture. The Roman, or edible snail (*Helix pomatia*), although not a common species, is found in numbers in some districts. It is of a much larger size than the common varieties, although its shell is not so beautifully marked. Almost any other creature that Fortune puts in our way can be dealt with in one or other of the prepared cases which have been described, from a full-grown rabbit to a harvest mouse, our greatest and ever-present difficulty being to secure our specimen as, in the words of the cookery book, we must first catch our hare then cook him.



“A. TANGLED GLEN.”

PART IV

ENTOMOLOGY

IN coming to the subject of Entomology the photographer is approaching a branch of work well-nigh boundless in its possibilities, fascinating in its study, and one which, being as yet but little practised and explored, offers possibilities even greater than any other, especially if the student is prepared to specialise and practise this as an exclusive work.

There is in this subject material for close and long-continued study, and it would afford work for the photographer throughout the season, the number of subjects that offer themselves leaving him little time to devote to other branches of work. In this, as in other branches, one of the early difficulties will be found to be the procuring of specimens, and for this purpose some knowledge of Entomology is required, the success attained being in direct proportion to the knowledge ac-

quired. Or if, as is quite possible, the photographer has a friend who is an entomologist, the two may with advantage combine forces and work together, the accumulated experience of the entomologist providing the photographer with abundance of material in the form of subjects for illustration. The photographer working alone is at first confronted with the difficulty of knowing where, when, and how to procure certain specimens for his work, the accumulating of the necessary knowledge in that direction requiring some years of close study. But a very great deal may be done even at the start in the way of illustrating many of the commoner species so readily met with.

Before dealing strictly with the photographic part of the work let us consider for a moment the life-histories of insects. These, as we know (as with the frogs and newts referred to some time back), progress by a series of apparently startling, though in reality easy, stages.

The different forms through which many of the insects pass afford a rich field for study as well as illustration, and it is on this account probably that Entomology as a science is so widely studied and is so vastly interesting. To commence with the Lepidoptera—or butterflies and moths—which are

only in reality a small branch of the order Insecta, but which would probably offer to the photographer the greatest inducement on account of their larger



WHITE PLUME MOTH.

size, beautiful forms, and gorgeous colouring, and probably better known habits.

It is probably well known to most people—although not all, it would appear—that the often

all too familiar caterpillar becomes in course of time either a butterfly or moth ; but how few have ever seen for themselves the means by which this wonderful and startling change takes place ! And yet how easy it is to watch and how delightful to follow out each little act of the wonderful little drama, probably only those who are familiar with it and who frequently watch it with ever-increasing pleasure can tell. Let us, then, in imagination briefly follow the evolution of a butterfly, selecting for our study one of our commonest as well as most beautiful butterflies — the Small Tortoiseshell — as being easy to obtain and whose various changes are performed in a particularly open and distinct manner. Although all butterflies pass through just the same forms as the one we have selected, there are minor variations in some of them amongst the butterflies, while in the moths a great deal of difference takes place in the third, or chrysalis, stage, some changing to that form aboveground, some burying themselves in the earth, or concealing themselves under the bark of trees, or hiding themselves in silky cocoons or coverings of various forms. But our specimen selected will form a good representative of the butterflies and their life-histories. About the early part of June the female butterfly deposits her eggs upon a plant of the

common stinging nettle, dying shortly afterwards without ever seeing her future progeny. The eggs are hatched in about fourteen days, and the young caterpillars on entering into the world find them-



FIG. 1.—YOUNG CATERPILLARS.

selves surrounded by an abundance of food, their first act, however, being to devour the empty shells from which they have just emerged. For the first day or two the young caterpillars remain very

closely together covered over with a silken net, but after eating away the leaf on which they find themselves they remove to the next available one. During the first week they feed in company (Fig. 1), keeping well together, but becoming separated and gradually wandering apart. This caterpillar, or larval, stage occupies about three weeks, during which time, as the caterpillars grow and increase in size, it becomes necessary for them to moult, or shed, their coats three or four times. The outer skin, which does not grow in proportion to the body of the creature, becomes at these times uncomfortably tight, when the caterpillar, anchoring himself with his claws to a carpet of silk previously fastened to a leaf, prepares to rid himself of it. The tightened skin, now stretched to bursting point, at length splits along the back, and after withdrawing his head and front legs clear of the old skin, he crawls, as it were, out of the remainder of his old coat which is left firmly fixed to the leaf where he rested. After a short rest, during which his bright new coat dries and hardens and his appetite sharpens, he commences to feed again with renewed energy.

In due course he becomes full grown (Fig. 2), and prepares himself for his next great change. He loses his appetite and ceases to feed, and crawls

restlessly about for some hours in search of a suitable spot in which to pass the helpless period of his existence. Selecting for his purpose the underside of a leaf or stem, he spins and fastens to it another carpet of silk which is to play an im-



FIG. 2.—FULL-GROWN CATERPILLAR.

portant part in his next process of evolution. Coming to rest upon the underside of the leaf, he gradually arches his back, which is downward, until, somewhat in the form of a horseshoe, he only touches his support at either end of himself.

Taking a firm hold on the silk with his claspers, which are at the tail end of him, he gradually lets go with his front legs, and, very slowly lowering himself, he at length comes to rest, head down-



FIG. 3.—READY TO CHANGE TO CHRYSALIS.

wards, with his body somewhat in the form of a hook (Fig. 3). This "lowering" operation has taken several hours to perform, and another rest is now required before the next visible act takes place. He thus hangs suspended for a variable

time—say from twelve to twenty-four hours—towards the end of which time we have signs that the most important and interesting act of all will shortly be performed. The head end of



FIG. 4.—SKIN OF CATERPILLAR SPLITTING—CHANGING TO CHRYSALIS.

him now shows signs of movement, slowly jerking and alternately expanding and contracting, which movements increase as the crisis approaches. We must now watch him very closely, or we may miss the crucial point. Gradually the jerkings

increase in vigour, the head and neck part is visibly swelling until at last, resting for a moment, we see the skin split at the neck (Fig. 4), and very gradually extend upwards. The jerkings and wriggings are now increased, the expansions and contractions of the body causing the skin to split higher and higher, and the lower part of the chrysalis body protrudes through the rent. Still wriggling and jerking with increased vigour, the skin is gradually worked backwards and upwards until a half of the chrysalis, or pupa, body is free. Now for the most beautiful and interesting part of all! How is he to free the tail end of himself without losing his hold and falling to the ground. It appears an impossibility, but he is equal to the task. Raising the lower part of his flexible body, which is divided into separate segments, with the folds or joints between the sections, he grasps and takes a firm hold of a part of the old skin. The upper, or tail end, which is now provided with a series of tiny hooks, is withdrawn, and, raising himself, he reaches up until he thrusts the tiny hooks into the carpet of silk above him, wriggling and twisting round and round in the most vigorous fashion, securely fastening his hooks into the silk, and at the same time breaking loose the old skin. Slowly lowering and straightening out his

body, he loosens his hold of the old skin, which falls to the ground as a tiny pellet of fur, and he hangs alone and secure (Fig. 5). This last operation, from the first splitting of the skin to



FIG. 5.—CHRYSIDES.

its conclusion, has taken place within the space of two minutes.

Here we have a creature, alone and unaided, going through a wonderful series of changes—a

thing he has never done before, and assuredly will never do again. And what precision is necessary for its successful accomplishment! his only guidance what we are pleased to call Instinct. One false step, so to speak, an insecure hold, and he falls to the ground, where he would soon die or fall a ready prey to one of his numerous enemies.

When first emerged in the chrysalis form he has a soft, moist, rather shapeless body of a greenish-white colour, spotted with black, which gradually hardens and darkens in colour until, at the end of twenty-four hours, it is of a yellowish-brown colour, with a beautiful metallic golden gloss. Under the skin we can now trace the position of the wings, legs, and other parts of the body.

Perfectly still in this position he now remains for a period of from ten to fourteen days, the variation in the time probably being caused by the state of the weather, when early one morning the pupa case splits open at the lower, or head end, and, carefully drawing himself out, the perfect butterfly makes his appearance, although not in the condition in which we are accustomed to see him. He looks now a poor limp, bedraggled creature, with a stunted and imperfect pair of wings, which give him the appearance of a deformed specimen. But such

is not the case. Another short rest is now required for his limbs and body to dry and harden and his crumpled wings to unfold. Hang-



FIG. 6.—BUTTERFLY HANGING FROM REMAINS OF
CHRYSALIS CASE DRYING ITS WINGS.

ing from the remains of the chrysalis case (Fig. 6), which is the best position for his purpose, his wings gradually expand and dry, and assume their normal size and gorgeous colouring. The antennæ are unfolded from over the back, where

they were formerly packed away, strength comes to the legs and wings and vitality to the whole body, and at the end of an hour or two he crawls to some higher point of vantage from which, after a few short trial flights to neighbouring objects, he gains confidence in his new and strange appendages and courage for his first flight into the world of flowers and sunshine in which he now finds himself (Fig. 7). But alas! life is short. The only mission that Nature now has for him to perform is the perpetuation of his species. The first few days are now spent in the bright sunshine, sporting with the many gay companions that he meets, and in sipping the juices of the flowers.

The female then settles down to the serious business of laying the eggs which are to provide the caterpillars for the next butterfly life-cycle. Then, again, a few more days are spent in enjoyment of the pleasures that gradually grow less and less, until in a short time the glorious pinions become faded and tattered by contact with the many flowers visited, and the body weary and almost too heavy to be supported by the feeble wings. At length, one day it is almost noon before the blazing sun calls it forth in a vain attempt to play with some younger and merrier passing companion, but the feeble wings can no

longer sustain the exhausted body, and after some weak attempts at play it settles down for the night upon some neighbouring flower, and thus passes quietly out of its brief and beautiful life.



FIG. 7.—THE PERFECT INSECT.

In order to obtain photographs of the different stages in the life-history of any of the butterflies or moths it is necessary for us to provide ourselves with some of the caterpillars in their very earliest stages, and to rear them and bring them through their various changes at home. There is no

difficulty whatever in this ; it is regularly done by entomologists every season for the purpose of supplying specimens for the cabinet. A well-ventilated box or cage, and a fresh and plentiful supply of whatever food-plant the caterpillars prefer, is provided, and their changes can be readily watched from day to day, and photographs taken as often as is considered necessary. At the time when the insects are about to change either into the chrysalis form, or to emerge as the perfect insect, a very close watch must be kept on them in order that the critical moment may not escape us. Although the life-history of the Tortoiseshell butterfly is fairly representative of that of the butterflies in general, yet variations in the form of the chrysalis and the manner of its suspension will be found in almost all of them, and it is this stage, in consequence, that must receive full attention. The caterpillars, too, vary equally in size, form, and markings, while the beautiful variety of the perfect insects offers us subjects for some fine series of pictures.

The nature and form of the cocoons of the moths vary considerably, some of them enclosing themselves in silk hammocks or webs, in papery, parchment-like, or woolly-looking cocoons, while others, as the Hawk moths, which spend the

winter in the pupa state, bury themselves in the ground and there change into that form. A series, solely illustrating the great variety of moth



CATERPILLAR OF ELEPHANT-HAWK MOTH.

cocoons would form an interesting and useful piece of work. Likewise in the matter of the caterpillars of moths there is variety enough for

a good series of pictures. In dealing with these attention should be paid to the food-plant upon



- CATERPILLARS OF DRINKER MOTH.

which they are found, and they should either be photographed where found, or, if treated at home, particular attention should be given to taking

with them some of their food-plant, as to an entomologist the picture of a caterpillar feeding



COCOONS OF DRINKER MOTH.

upon a wrong plant is something worse than useless. The furry caterpillars of the Fox, the Drinker, and the Tiger moths, the curiously tufted

larva of the Vapourer moth, the banded caterpillars of the Cinnibar moth, the large, smooth, striped caterpillars of the Hawk moths, the curiously marked Elephant moth, the strange shapes of the Puss and the Lobster moths, to mention only a few, would all go to form pictures of a most interesting collection of this one branch alone. A few series of some of the representative forms of both butterflies and moths, comprising one picture each of the larva, pupa, and perfect insect would be instructive, and well repay the photographer.

No great difficulty should be found in photographing the caterpillars and chrysalides, but in the case of the perfect insects, if pictures are required of them when alive, various plans must be tried for keeping them within bounds. It is always more satisfactory, if possible, to secure pictures of them from life, as, although when dead they may be set in any desired position and then photographed, there is always the risk of error in picturing an unnatural position. One good plan of dealing with live specimens is to bring home the butterfly from the field, carefully shut up in a dark box in which he is allowed to remain all night. Next morning as early as possible—and if it should happen to be a dull or cloudy morning

it is all the better for our purpose—the camera is arranged and suitable flowers or plants prepared



DRINKER MOTHS, MALE AND FEMALE.

on which to place our subject. This must be done indoors near to a window. The box is now carefully opened, when the butterfly will be found

either asleep, or at least quiet and at rest, when he may, with care, be placed in the position selected for him. In most cases he will be found to remain quite still for some time with his wings folded at rest, and as he begins to get accustomed to the



“PAINTED LADY” BUTTERFLY.

light his wings are gradually opened, usually giving us ample time to take one or two pictures before he becomes restless and takes to flight, which he will do as soon as the sun catches his resting-place. The Painted Lady shown in the illustration was taken in this way.

Very successful butterfly pictures have been

taken out in the fields of the insects in a perfectly free state. For this purpose a long extension focussing hand camera is required, and a more than usual amount of patience, as it requires some



COMMON BLUE BUTTERFLY ASLEEP.

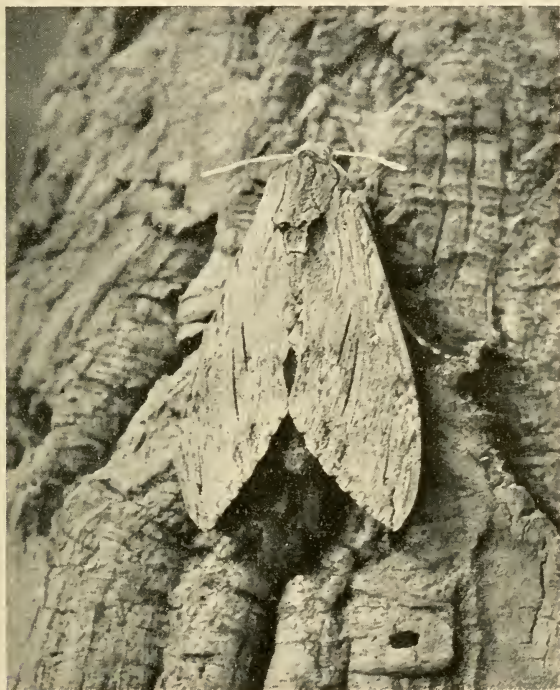
careful stalking to be able to get, even for a second or two, within sufficiently close range to give us anything like a fair-sized image on the plate. For such an operation it is almost impossible to employ a stand camera on account of the time taken before the apparatus is ready to make

the exposure. Occasionally a butterfly may be seen in the early morning fast asleep on some flower, offering a pretty subject not to be missed. Some species, as the Common Blue, habitually "sleep out," and on any early August morning numbers of these pretty little butterflies may be seen on the grasses and low herbs fast asleep, often with their wings covered with tiny drops of dew. As the sun rises and its rays reach and warm their little bodies, their wings are slowly opened and they take to flight, after which there is little chance of getting near enough to photograph them. Many of the moths remain fairly quiet in the daytime, and with care can be easily arranged and photographed.

The *Convolvulus* Hawk shown in the illustration was perfectly quiet in the daylight, and allowed himself to be placed in any position without making any attempt to escape, but at dusk his activity was simply astonishing.

In order to obtain specimens for illustration the photographer will need to provide himself with net, collecting boxes, and the few other appliances of the entomologist, and prepare himself for many a pleasant expedition into the country in search of specimens. Some attention should be given to the study of the times of appearance, localities,

and habitats of such insects as he requires, the food-plants on which the different caterpillars feed, and



CONVOLVULUS-HAWK MOTH.

the time of the season when they occur, as until some knowledge in that direction is acquired disappointment may be experienced in not meet-

ing with a desired specimen. Although many of our butterflies, for instance, are out for a considerable part of the year and in almost any locality, yet many of them are on the wing but a very short time, and also are very local in their distribution, so that unless we look for them in their particular locality and at the right time—within a certain limit—we probably miss them altogether for the season. Some insects will be found to be particularly abundant in some districts, often confined to quite a limited area, although the surrounding country, to all appearance equally suitable, knows them not. Others are equally rare in some districts, and for these excursions must be made to other and more favoured spots.

Methods of capturing and obtaining moths are also many and various. With some varieties, for instance, there is little chance of catching specimens at all in the perfect state, although it may be of a species far from common. The practice in these cases is to breed them from the egg or the caterpillar, and this, for such as have the necessary time, is a most instructive branch of Entomology. Here again some knowledge is necessary as to the nature of the insects so as to provide and surround them with conditions as nearly as possible to that of their natural state.

Others are obtained by searching during the daytime their favourite resting-places, by collect-



BURNET MOTH JUST EMERGED FROM THE COCOON.

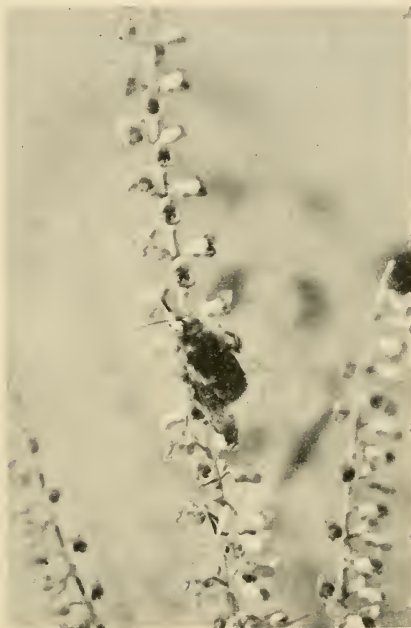
ing the caterpillars or hunting for the pupæ. A mothing excursion in June or July is a particularly

enjoyable and often profitable form of sport. After a hot day a few hours in the evening, spent along the hedgerows or by the woodside, is a most delightful experience, and it is bad fortune indeed that does not reward the entomologist with a good number of specimens of various kinds. At dusk the moths are most plentifully on the wing, and right on into the twilight there is plenty of work for the net. Then at dark the lamp is lit and work continued as long as time permits.

Later in the season the well-known method of "sugaring" is practised, which consists of painting on to tree-trunks (in a locality that is considered favourable) a mixture of treacle and coarse sugar with which has been mixed a small quantity of beer and rum. The trees are visited later on with a lantern, when the moths are found busily lapping up the treacle, and at the same time rendering themselves intoxicated by the liquor it contains. This plan is often productive of good results, but as often equally disappointing, the conditions of weather greatly influencing the captures; the moths prefer a warm, dark, damp night, while a cold or a moonlight night is useless for the purpose.

Some photographers have succeeded in making pictures of moths so engaged by means of the

magnesium flashlight. A very interesting picture should result when this method is tried on a tree



HUMBLE-BEE ON WOOD-SAGE.

where a dozen or so moths—as may sometimes be seen—are found hard at work.

Humble-bees are easy subjects to photograph if treated in the right way. The easiest way to

photograph these is to seek them out in the early morning, while they are still asleep on some flower. Go any morning in August to a spot where the Woodsage grows, and on the plants in the shadow of the hedge plenty of specimens can be seen fast asleep. As this is a low-growing plant the tripod must be used as short as possible, the camera carefully focussed on our subject, and a study or two made while he is yet asleep. As he wakes and stretches himself and takes up different positions, as many pictures as necessary can be made before he flies away. Humble-bees seem to be remarkably good sleepers. One morning I noticed one fast asleep on a tall thistle growing by the roadside. A gentle breeze kept the thistle constantly on the move, so it was cut down near the root and carried, head downwards, about a quarter of a mile, until, coming to a sheltered spot, the thistle was placed in the hedge, the camera prepared, and a photograph taken, after which the camera was repacked and the bee left still fast asleep.

Another plan for photographing bees, wasps, and other insects, that some have found effective, is to seek out a group of flowers which are seen to be visited by bees, and selecting a flower of the group to focus the camera on that, set the shutter

and wait the arrival of an insect, and when he comes to the spot focussed on to release the shutter. I can only confess to indifferent success with this plan.

In dealing with such comparatively small subjects as these there are two difficulties to contend with—the difficulty of correct definition without an excessively small stop, and that of exposure when the shutter is used. When working at such a short range, in order to get our insect of a reasonable size on the plate, the camera must be extended to an abnormal length, the amount of light thus reaching the plate being far less than when the camera is used at its usual length, as in the case of landscape and ordinary photography. For instance, if the bellows are extended to twice the usual length (which is the extension required to photograph anything natural size) although the stops actually remain the same, yet their working values are about halved, requiring some four times the exposure that would under ordinary conditions be given.

This is a serious consideration if we attempt to make shutter exposures.

Dragon-flies also make excellent subjects.

By the banks of streams and ponds throughout the summer, and along the woodside in the early

autumn, these beautiful insects are found in numbers, and now and then one may be stalked with the camera near enough for a picture, or the more wary ones taken in a butterfly net to be dealt with at home.



DRAGON-FLY.

The large flat-bodied specimen (*Libellula depressa*) found in woods in early summer should make an excellent picture.

The life-history of the dragon-fly, as is well known to entomologists, is extremely interesting. The eggs are laid by the female insect just below the

surface of the water on a reed stem. These hatch in course of time and produce as larva a rapacious monster armed with a formidable pair of jaws, who proves himself the terror of the pond or stream. The second, or pupa, stage differs but little in appearance from the former, the perfect insect making his appearance later on in an interesting manner by literally crawling out of the body of the pupa suspended from a reed stem, afterwards climbing to some point above the water where his wings dry and harden in preparation for his first flight.

This interesting series of changes has been already pictured by the brush and pencil of the Naturalist, but still awaits the attention of the photographer.

The difficulties of the task are obvious.

Although the great majority of that large section of insects included in the Coleoptera are too small to be dealt with direct, without some method of magnification, there are numbers of the beetles worth photographing, notably the Stag beetle, several of the Carabidæ, or ground beetles, the large Water beetles, the Chafers, numbers of the Longicornes, including the handsome Musk beetle, and also the very interesting Glow-worm, which is not a worm at all, but a beetle. The light of

this curious creature—which is produced by the female—seems to be provided to attract the males. That it does so can be seen by placing a female in the road and watching for a few minutes, whilst, when mothing at night with the lamp, the males often fly towards the light, settling on our hands and arms.

For such small subjects a good plan is to photograph them with a half-plate camera in which quarter-plates are used, as this gives us an object of a reasonable size, the largest of which can be comfortably accommodated on a quarter-plate.

Beetles may be found almost everywhere, and it seems impossible to search anywhere without coming upon specimens of one kind or another. Turning over stones and rubbish, searching under the bark of trees, on the heads of flowers, and the leaves of plants and shrubs, we are almost certain to be rewarded by some captures, while the water beetles are obtained from the same localities as our tadpoles and newts.

There are still many other insects large enough for the photographer's purpose. The Grasshoppers include many large and lively specimens, the largest of which, the Great green grasshopper, as shown in the illustration, is a large insect with



THE GREAT GREEN GRASSHOPPER (*Acrida viridissima*).

a wing-spread of nearly three inches. It is, however, rather a local species.

The Crane-flies, the Caddis-flies, Lacewing-flies, Scorpion-flies, May-flies, and several others, are large and beautiful enough to form some really fine studies, and are bound to be encountered sooner or later by the photographer. But the student who intends to make a speciality of photographic entomology will not wait for these chance meetings, but will soon learn when and where to search out the various insects he requires for study and illustration.

A very little experience will prove to any one that in this section there is work to occupy even the most energetic for many years, and that one who attempts other branches of work as well can only hope to touch the fringe of the subject.

Although spiders are not classed as insects, and do not, therefore, come as a rule, within the ken of the entomologist, still the photographer-naturalist will not be able to afford to disregard them on this account, but will probably find them an interesting branch of study possessing considerable possibilities.

The best time to take in hand this work is during the late summer and autumn, then specimens are found in abundance everywhere. Every

hedgerow, bank, and gorse-bush will provide us with something worth photographing, while in the course of an evening's "sugaring" numbers of large and beautiful specimens are found on the tree-trunks.

A spider's nest—where the young are reared, not the snares which are spread to catch its prey—is an interesting object. Under a canopy of silk suspended amongst the foliage is seen a little round ball of some substance of a dark colour. Touch it with a straw and instantly it splits up into scores of tiny atoms which scramble away on little legs in all directions. These are the young spiders, which soon return and cluster together again. The large hammock-like snares which are spread out from the hedges in the summer, and where the occupant sits at the entrance of a little tunnel intently on the watch for his prey, provide subjects for a plate or two, and the geometrical webs or nets which are so common in the autumn are beautiful as a photograph as well as most ingenious in their construction.

No more interesting entertainment is afforded the naturalist than that of watching, on some early autumn morning, a spider engaged in constructing her net or in repairing the damage to one caused by the wind or by the struggles of some captive



SPIDER'S NEST.



SPIDER AND DAMAGED NET.

of the previous day. If we examine the net with a pocket lens, it is seen that the silken cords composing the circular rays of the net are covered with tiny drops of a sticky, viscid fluid—a wonderful provision of Nature—which causes the insects coming in contact with the net to adhere, and in their struggles to escape to become only more and more entangled in the fatal meshes. The “rays” of the net which radiate from the centre are fixed to the surrounding foliage and serve as supports to the structure and also as pathways to the spider by which to reach the centre—these are dry and not provided by her with the drops of sticky fluid.

Watch her, too, as she makes a capture, how she sits intently on the watch, away at the extreme edge, concealed beneath a leaf, until a faint tremor of the cords of the net, made by the first struggles of some prisoner, causes her to rush out upon her prey, seize it in her claws, and, as she rolls it round and round, to pour forth from her spinnerets fresh strands of silk, with which the unfortunate creature is securely wrapped round and round until helplessly bound, it is now completely at her mercy to be either killed and sucked dry at once or carried off to provide a future meal.

When beautifully crystallised with hoarfrost or

covered on every strand with tiny drops of dew, which glisten and sparkle like diamonds, no more beautiful object for a photograph than a spider's web can be imagined. It is hardly necessary to mention that these effects are only to be seen in the early mornings before the sun has reached them or the drying wind has evaporated the moisture. A still morning with no wind must be selected for photographing them, as these delicate structures vibrate with the least movement of the air and shake off many of the tiny drops, which spoils the effect of the design, while in the picture absolute sharpness must be secured and no blurry effect caused by movement be permitted. Those nets should be selected which hang out well away from the hedge, and as much as possible of the foliage behind very carefully removed with a knife or scissors, care being taken not to jerk the net in the least. The darker the background for this subject the better, as the net will then stand out in greater relief.

Probably the most interesting branch of all in insect photography is that dealing with mimicry and protective colouration. This subject offers great possibilities to the photographer. A good deal has already been done in this direction, but there must still be a great deal of untrodden





SPIDER'S NET OR SNARE.

2021
15/11/21



BE-DEWED SPIDER'S WEB.

ground where the specialist would find full scope for his energies. The one or two illustrations shown only deal with the more familiar and obvious examples of this most interesting subject, but very many equally beautiful ones are to be seen exhibited in any good museum.

The illustration of the two Orange-tip butterflies, showing one with the wings expanded and one with the wings closed, in the resting position, when the mottlings of the undersides so accurately resemble the appearance of the flowers of some of the *Umbellifera*, is a case that is well known and has been extensively used in illustration of the subject. But the full beauty of the resemblance must be seen either pictured in colours, or, better still, in the actual specimens, to be fully appreciated.

The case of the Red-underwing moth is equally well known, and has also been largely drawn on for the purposes of illustration. The upper wings of the moth, which are the only ones seen when at rest and which completely cover and hide from sight the rich red lower wings which are marked with broad black bars and have a white fringe, beautifully imitate in colour and markings the bark of the trees on which they often rest in the daytime, thus giving them ample concealment, although their resting-place may be

a very exposed position and in the full light of day.

Many of the caterpillars of that section of the moths known as the "Geometers" form excellent examples of protective mimicry, and afford the photographer opportunities of making a number of studies of this curious and beautiful provision of Nature. Resting on a leaf or stem they support themselves by taking a firm hold with their claspers, their bodies sticking out rigidly at an angle. The lower part of the body being, as it were, wrapped round and closely fitting to the branch, they look like nothing so much as a short piece of stick, a leaf stem, or a rolled up leaf—according to their colour—anything, in fact, but a caterpillar, and many an entomologist has been deceived, and has only discovered the caterpillar by accidentally touching it and feeling it soft. The very best instance I have yet seen was that of the caterpillars of the Early thorn moth, which were kindly sent to me by an entomological friend for the purpose of illustration. They feed upon the leaves of the plum, which they appeared to do mostly at night. By day they rest, sticking out motionless from the branches, as shown in the illustration, when their appearance may be safely said to defy detection



ORANGE-TIP BUTTERFLIES.

(Showing one with wings opened and one with wings closed in resting position.)



RED-UNDERWING MOTHS.

(Showing one with wings opened and two with wings closed at rest.)



3
2
1

4

CATERPILLARS OF THE EARLY THORN MOTH.

by any but a thoroughly expert entomologist. Not only do the colours of the caterpillar *accurately* match that of the stem, with its peculiar purplish-brown tint, its grey-green, weather-stained markings, which in places appear as a peculiar "bloom," but the shape of the creature is even, if possible, a greater resemblance. The little swellings, or nodes, of the branches are *exactly* repeated by similar swellings on the body of the caterpillar, the whole forming an example of imitation that is perfectly astounding.

The Buff-tip moth is another good instance of mimicry. The moth when at rest wraps its wings closely round its body. Its head, and the tips of the wings which form the opposite ends of a small cylinder, are of a buff colour, which give it the exact appearance of a short piece of stick broken at each end.

The undersides of the wings of most of our butterflies (which is all that is seen of them when they are closed at rest) are marked and coloured in close imitation of the markings on the rough surface of the bark of trees, or of dead or withered leaves and grasses, or of the ground itself, making the insects almost or quite invisible to all but the most practised eye when they settle to rest. Similarly, many of the

moths which are quite richly and beautifully marked, imitate very closely the colours and mottled appearance of tree-trunks, walls, lichen-covered fences and palings on which they settle, as secure from detection from most of their enemies as though they had retired to far more secluded situations.

It is only possible to illustrate or even mention a few of the many cases of this most interesting branch of study. It is a branch which gives opportunities for a very great deal of valuable photographic work and which has, as yet, been but little studied photographically.



“SPRING FLOWERS.”

PART V

BOTANY

I N commencing the last part of this little work one cannot escape the feeling of presumption in attempting to deal with such a large, beautiful, and extensive subject as Botany, within the limits of the space—both in the matter of text and illustration—still left to me. It almost goes without saying that the photographer, in order to achieve even a moderate amount of success, must specialise in this branch, which is fully deserving of his undivided attention, and requires the utmost of both his technical and artistic abilities to do it anything like justice. To many it must appear that flowers with their glorious wealth of colour are subjects that defy the photographic process, but although we are limited in our results to a monochrome representation, still the fidelity of the lens to accuracy of drawing, and the present degree of perfection to which

the orthochromatic plate has brought the securing of correct colour values, enables the flower-photographer to secure studies, which in point of beauty are difficult to surpass as pictorial works, and as botanical studies rank infinitely higher than anything it is possible to produce by any other monochrome process.

The reason why I have been induced to include a few short and fragmentary notes on the photography of botanical subjects, is that in the course of his many excursions into the homes and haunts of the creatures with which we have already dealt, the photographer is constantly brought into such close and frequent contact with the marvellous wealth of flower and plant life, that it is impossible for him to disregard this most beautiful and wonderful department of Nature, or to be able to resist at times the temptation—especially when the supply of other subjects, for the moment, runs short—to expose a plate or two upon some tempting and pleasing tree, or plant, or group of flowers.

In the course of his early spring rambles, how greatly the Naturalist-photographer welcomes the first signs of returning life in the opening blossoms of Violet, or Primrose, or Lesser Celandine. He must indeed be an unsympathetic photographer,



“SPRING.”



WILD ARUMS.

be he Naturalist or no, who feels no temptation to expose a plate upon the first group of Primroses he finds for the year down in the wood, and as Anemones, Stitchwort, Wild Arums, Dead-nettles, and the countless other members of the vernal pageant appear in due order, how he watches for them and welcomes them back again as old friends. And so right on through the summer with Foxglove, Wild Rose, and Honey-suckle, till autumn fruits and berries and the rich tints of the changing leaves bring another season to its end, he finds something constantly coming and going, of which he wishes to retain some memory if only in the form of a monochrome photograph.

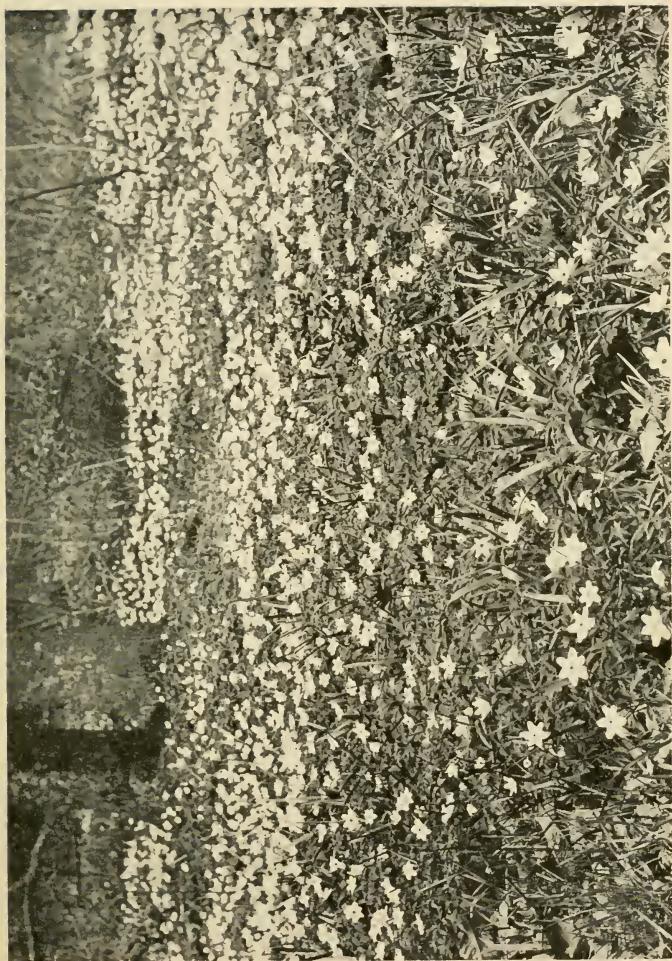
With many of our common, but none the less beautiful, wayside and woodland flowers, it certainly seems that a considerable part of their charm is derived from their surroundings, in which cases the most successful results are obtained by photographing them *in situ*.

In such results we get the flowers in all their natural beauty, and whenever it is practicable this plan seems to give the most satisfactory and pleasing pictures.

But in this method of work we soon find ourselves confronted by one real and almost

ever-present difficulty—the difficulty of the wind. To those who have had no need to keep note of the matter, it would seem that the occasions on which the wind could seriously interfere with our work, must be but seldom; but this is far from the case. It is, in fact, but rarely that the air is found so still that flowers whose nodding heads are supported on long and slender stems are not constantly swaying to and fro, which makes the matter of exposure one of the greatest difficulty to the photographer. It has often been suggested that even on a windy day some spot in the shelter of the hedge, or down in some quiet situation, may be selected, where no wind could reach our subject. But what if our subject does not happen to be there? It means that we must transplant it to such a spot—in some cases obviously an impossibility, and in others undesirable if we wish it to retain its natural beauty or to picture it growing in its own natural habitat.

Anemones, for instance, appearing as they do in the month of March, seem rightly named the “wind flower,” for often throughout their season there is not a day that could be called still, when their delicate heads are not swaying more or less violently in a rough breeze that sweeps through



WOOD ANEMONES.

the leafless woods. In such a case photographs may be taken by patiently waiting for a favourable moment for making the exposure, when, during a lull between the gusts, an exposure of a second may be given without showing any serious movement.

With sprays of flowers, such as catkins of the hazel, or the willow palm, or of wild roses, we have the advantage of being able to remove them to some more sheltered spot, should our selected spray be growing in too exposed a place, and in such cases we are able to use for them an artificial background if desired.

It has been recommended that the flower-photographer should provide himself with a variety of materials, to serve as backgrounds, and for this purpose large sheets of brown paper of various tints answer very well for subjects up to a reasonable size. It is often a matter of some difficulty to find a portion of the landscape that affords a good and suitable background for a flower study, as backgrounds of natural foliage often give a spotty and unpleasant effect in the result. So that for those studies in which it is desirable to isolate the flower or the group from its surroundings, it is necessary to use an artificial background of some kind the material for which can only be

determined by the nature and colour of the subject itself. A moderately tinted one such as the brown paper suggested will be found very suitable for most purposes, as white or light flowers are thus thrown into sufficient relief, and darker ones, fruit, or berries, will be afforded ample contrast. This is all considering work in the country or out of doors. There always seems a certain freshness and natural beauty about studies of flowers and plants secured where growing under natural conditions, and, as has been suggested, the photographing of these often give considerable pleasure when other subjects are not to hand, and enables us to bring home pleasing and beautiful studies on plates that would otherwise have been empty and accumulating material for a fine crop of pinholes.

But there are also many flowers that can be photographed better and even more conveniently at home. Take, for example, the orchids. Many of these are plants of a small size, in photographing which a considerable amount of trouble would be involved in working the camera low enough down—in fact, no other plan could be used than that of lying at full length on the ground and supporting the camera on something but a few inches high. Such flowers would rarely or never

make a picture, properly so called, and the best use we can make of these is to obtain botanical



FLY ORCHIS.

studies of them, which may be equally interesting to us and even more valuable. True, some of the orchids (such as *Orchis fusca*) are large enough to

photograph where found, but many of them—the Bee, the Fly, and the Spider, to mention only a few—will be more successfully dealt with at home.

There are several methods of photographing flowers at home, as used by different workers. The plan more generally used is that of photographing them vertically. The stand for use by this method may be prepared as follows: A stout baseboard, about thirty inches long by nine inches wide, has fixed to it and firmly braced a vertical board about three feet long. A long slit is cut down the centre of this vertical board to within about one foot from the bottom and three inches from the top, to take the camera screw which usually goes through the head of the tripod, which allows the camera to slide up and down and to be adjusted to any height. About six inches up from the bottom a plate of glass is supported, resting on brackets fixed to the vertical board or by some simpler means. On this plate of glass the flowers are arranged, underneath which is placed a sheet of brown paper, tinted card, velvet, or other material, to act as background, the camera thus pointing down on to the subject, the focussing and arranging being done from above. The apparatus is used near a window in

diffused light, for preference, but never in direct sunlight, and a hand mirror held so as to reflect



BEE ORCHIS.

light upon the shadow side farthest from the window.

It is hardly necessary to say that exposures in

this work run considerably longer than for work out of doors, but as we have no difficulty from wind to consider, this is of little consequence.

It can be at once seen that the arranging of a group or a number of flowers lying on the plate of glass is a very much easier matter than the same number supported in any other way, as even when arranged in a vase with water many flowers droop a good deal (and when not provided with water considerably more) but the advantage of being able to adjust the height of any one without disturbing the others will be at once appreciated on the first trial. Other plans have been suggested, such as twisting up a strip of lead in a close zig-zag fashion, into the folds of which the stems are inserted and the lead squeezed closely together; but with this plan, even if placed in a saucer of water, the flowers—especially those with fairly large heads on long stems—are apt to droop a good deal, and also to move with the least vibration. Another method is to pin the flowers with long, fine pins to a background of tinted cardboard; but this may also have its disadvantages by the flowers casting shadows on the background, unless it may be desired to show the shadows as part of the picture, which often gives a good effect if properly managed.



HORSE CHESTNUT.

With most of the orchids a quick method of supporting them is to pin them, head downwards, to a lath of wood fixed some little distance away from the background, the lath and pins being, of course, excluded from the picture. This plan will only answer in those cases where the foliage will not, when hanging in this way, take too vertical a position when the photograph is seen the right way up, as on the screen of the camera.

For all such methods of work indoors, where the flowers are supported in vases or otherwise, it is a great convenience to be able to dispense with the tripod and to use a small stand for the camera instead—one that will allow the camera to be adjusted to any height (within the limits of ten or twelve inches is sufficient), be tilted at a moderate angle, and be moved nearer to or farther from our subject as the case may require.

Something on the lines of that suggested for outdoor work and illustrated at the end of Part I., only much smaller, for use on a table, would answer well and be found very handy.

In the great majority of flower studies, whether photographed indoors or out, orthochromatic plates will be found a first necessity. These should also be backed, otherwise in dealing with white flowers, especially if they are shown against even a mode-

rately dark background, or foliage, some traces of halation will almost always mar the result. It will not always be necessary to use a yellow screen, in many cases there will be nothing gained by the extra exposure required, but for such flowers as are of a blue or violet colour, unless the screen is used the colour values of the result will be wrongly represented, these latter colours photographing much lighter in tone than they appear in nature unless the screen is used to keep back, to some extent, their activity. In white flowers, too, where the delicate shadows often partake of a slightly blue tone, a screen will be found to give a much better graded result.

In development, especially of white flowers, great care must be taken not to get too hard a negative, and for this purpose the developer may be used diluted with a half or an equal bulk of water, so as to get as soft and delicate a result as possible.

No useful indication can be given as to the exposures required, but one or two trials will soon decide the matter for the worker himself. On a fairly bright day, for instance, with a plate of moderate speed, and with the lens stopped down to $f16$, an exposure of from twenty to thirty seconds, according to the distance from the window, will probably serve.



COTTON SEDGE.

The photographer who intends to specialise in this branch of photography will find no lack of material or subjects for illustration almost all the year round, as there is scarcely a month when some kind of wild or garden flowers may not be obtained.

Likewise there is no necessity here to dwell on or attempt to describe the abundance of subjects to be found in Nature on every hand, throughout the spring, summer, and autumn seasons. The worker who attempts this branch at all will soon find himself surrounded with so many inviting subjects, that his only difficulty will be not what to take, but what to leave. Many of our flowering grasses, rushes, and sedges deserve more attention than they have yet received from photographers and to any one possessed of some artistic ability they offer opportunities of making many beautiful decorative studies. Fruits, berries, seeds, and nuts may also be made to yield many interesting pictures, or be treated as botanical studies, which cannot fail to be of some value. It is only the photographer who practises Botany as an exclusive photographic study that can ever appreciate the full possibilities of the branch. The casual worker who dips here and there into the work, and tries his hand at usually the most hackneyed subjects,

can never hope to gain much of an insight into its possibilities or to produce results other than those of a very moderately successful nature.

I have long felt that our native trees have deserved a larger share of attention from the Naturalist-photographer than they have yet received. Not that I mean they have been neglected entirely, as they have, ever since the earliest days of our art-science, played a prominent part in countless landscape photographs, and from their nature and natural beauty, when seen as part and parcel of a landscape view, they must ever continue to charm and to induce many future generations of photographers to expose their plates upon them. But in such instances it is only because of the part they play in some scheme of composition, and not so much because the worker is desirous of securing a faithful record of the tree itself.

The manner in which I believe some interesting and valuable tree-photography might be accomplished is rather in the way of securing series of pictures which should attempt to be purely records or representations of our trees, illustrating them in detail. Such a series, to be complete, and to picture the tree in its various aspects, would need to comprise a number of negatives. For instance, one should be of the tree in the full beauty of its

summer foliage, another should represent its



WILLOW PALM.

winter aspect, another a group of its leaves, others
its seeds, its fruit, its trunk, a portion of its bark,

its limbs, its bole, or any other peculiarities it may possess, which it is necessary to illustrate for the purposes of identification. Possibly this may sound a not over-interesting branch of photography—indeed I have been told so by fellow-workers—but I am still confident that to the Nature-lover, to whom trees are of more interest than merely beautiful accessories to a landscape, such a collection of photographs would be of immense interest—an interest that would, moreover, increase as the collection of series grew in number; and that it would prove of value as a means of education I do not think admits of any question. How many ordinary persons are there who could name at sight a dozen of our native trees? while as to their recognising a bunch of leaves or a bit of the bark, the number might be safely brought down to half a dozen. Such an album of pictures could not fail to be of interest to any botanist or Nature-lover, which collection should, of course, include such familiar trees as the pines and firs and several others, which although they may not be indigenous, have yet become such a feature of our native landscape that we always consider them very much our own. Rightly or, wrongly, I am inclined to feel that here photography has a useful and a valuable opening.



FOXGLOVES.

Other divisions of Botany have served to attract photographers from time to time, and by offering the possibility of a good deal of interesting labour and research have induced workers to devote much time, thought, and care to the faithful representation of the subject.

Such a one may be found in our native vegetable galls. This is a branch that calls for some special knowledge, both of a botanical and entomological nature, and that there is room in such a subject for more workers will hardly be disputed.

How limited is the knowledge—or at least to what a few is limited any knowledge—of the nature and formation of these familiar objects.

To the average observant person, and even to the average Naturalist, they are the product of some species of fly. We learn that they are produced by the insect puncturing the bark or leaf tissue of the plant for the purpose of depositing its eggs, and there our acquaintance with the subject generally begins and ends. True, the whole matter may not to the average photographer or Naturalist present those interesting features, or give promise of such fascination as many other better known subjects, on which such an abundance of information is readily obtainable. But here again the specialist finds much of interest and beauty that is not

apparent to those who bestow upon the subject merely a passing glance.

Another such division is that of Fungus.

Very little seems to have been done in the way of photographing these curious and often very beautiful plants. If richness and delicacy of colour could be any inducement to the photographer, this branch should run flower-photography very closely.

A morning's fungus hunt in autumn, especially during a wet season, will convince any who may not have previously been aware of the fact, that some most beautifully coloured specimens in great variety are to be met with. Unfortunately for our purpose (whatever may be the ultimate result of photography in colours) the present results obtainable do not warrant us in choosing always the most beautifully or delicately coloured objects for our purpose. But the variety of shape, form, size, and markings of fungus deserve some recognition from the photographer and offer him subjects for pictures well worth the doing.

Besides all the foregoing sections of Natural History Photography, with their branches and subdivisions, there is still one class of subject which cannot fail to entice the photographer's passing attention, and that is landscape photography.

Although the artistic and the scientific aspects of photography may be declared to be as wide as the poles asunder, such a fact—if fact it is—will not be sufficient to deter the true lover of Nature from the attempt to secure, by means of his camera,



“A WOODLAND PATH.”

some record of the scenes and places he has known and loved so well, and to fix in some more lasting and tangible form than on the tablets of his memory visions of the many—to him lovely—spots where happy hours have been spent in the search for subjects for his photographic work,

or where pleasant rambles have been undertaken for the study of some branch of work in which he has been interested. Many a beautiful spot is found and visited again and again with increasing pleasure—some little earthly paradise, far from the madding crowd, known only by those who chance upon it when off the beaten track in the course of a country ramble. Is it to be wondered at that the photographer, although devoted to work of a different nature, should wish to retain some record of a place that is dear to his heart and beautiful in his eyes? He may or may not be possessed of the special knowledge that goes to the making of a perfect picture. More likely than not his result will be sadly lacking in some essential pictorial quality, but to him the record will be just as valuable, and probably, in his eyes, just as beautiful. It is not possible or desirable here to go into any lengthy description of the essentials of the pictorial photograph, or to attempt to deal with the intricacies of composition, lighting, and the other elements of landscape photography, even if the writer possessed the ability to do so. Numerous excellent treatises on the subject exist, a study of one or more of which will form a useful education to the lover of Nature, and help him to appreciate her beauty even more and more, to

educate his eye to see and his mind to receive many valuable and beautiful impressions he would otherwise miss.

In concluding this little volume, the writer is only too fully conscious of the fact that all he has attempted to set forth and the subjects he has endeavoured to cover have only been dealt with in a most superficial way. The only attempt that has been seriously made has been to suggest to those about to take up the fascinating pursuit of Natural History Photography the wide field of work from which to choose, and by a few hints of a practical nature to indicate the methods of setting to work.

The statement may be perhaps again permitted that no worker can ever hope, within the limits of one short lifetime, to exhaust the possibilities of the whole, or even of any of the foregoing subjects, and that thoroughly to appreciate and be able to do justice to any of them the undivided attention and the best energies of the student must be given. The best and most valuable work in any department of Nature study will be found to come from those who have made a lifelong study of their subject. On the other hand, there are many of us who feel too ignorant of any subject to ever hope to be able to do anything valuable in any particular

direction. To us all Nature is beautiful. She is everywhere enticing. She seems to beckon us in one direction, which we follow for a time, only to strike off suddenly at a tangent and pursue some



“WHEN ALL NATURE SEEMS AT REST.”

other course leading us to “fresh fields and pastures new.”

Our results are perhaps interesting—to us ; they may in some cases be even beautiful, they can never be valuable. What matters it to us ?

Life is so short we feel we must enjoy it to the full. We know that we ought to try to do some-

thing that may be valuable, something for the benefit of Science, which has done so much for us ; but our waywardness, after all, is but a reflection of Nature herself.

How many lessons do we learn from her ! How much help and encouragement do we receive from her to enable us to take our part in the battle of life ! and, more than all, how fully do we realise the significance of the words of the immortal Ruskin : “ God has lent us the earth for our life ; it is a great entail ! ”

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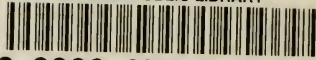
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